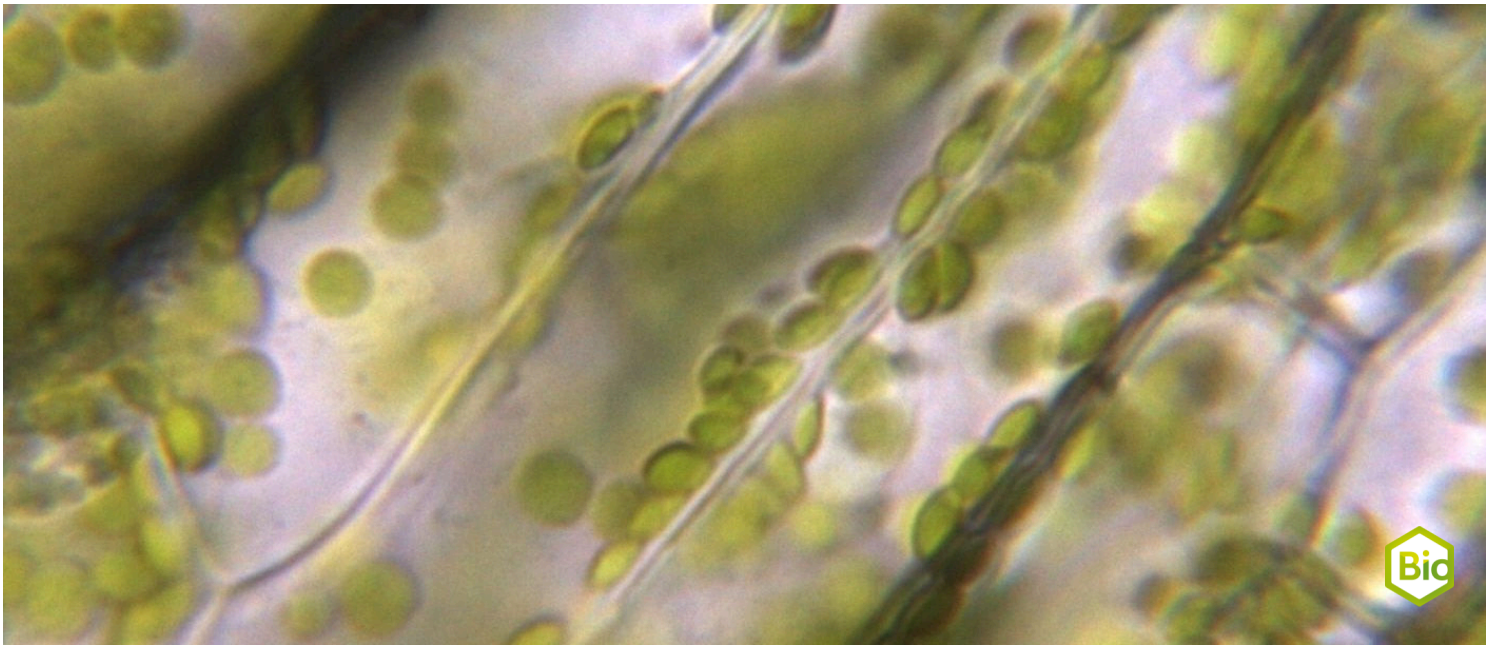
# Plasma currents in the water plantain



| | | |
|---|---|---|
| Biology | Microscopy / Cell Biology | Plants & Fungi |
| Biology | Microscopy / Cell Biology | Cell structure |
| Biology | Plant Physiology / Botany | Physiology of plants |

| Difficulty level | Group size | Preparation time | Execution time |
|---|---|---|---|
| easy | 1 | 10 minutes | 30 minutes |

This content can also be found online at:

http://localhost:1337/c/612896714839a1000394d73c

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# Teacher information

## Application

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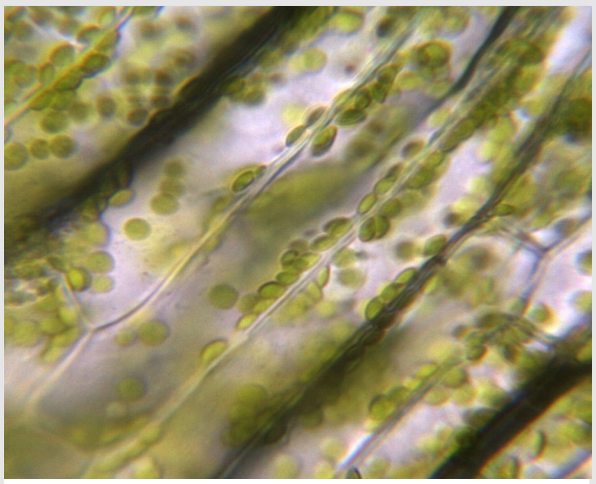

Water plant (Elodea spec.) (100x)

The cell is a reaction space in which a lot is produced and broken down, i.e. in which a lively metabolism takes place. The constant movement of the plasma in which these substances are dissolved ensures the rapid transport of substances.



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## Other teacher information (1/5)

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**Prior knowledge**

Students should be familiar with the structure of plant cells. They should also be able to make a fresh preparation and be familiar with the use of a microscope.

**Scientific Principle**

To familiarize students with the effect of salt on plant cells.

## Other teacher information (2/5)

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**Learning objective**

The students should be able to recognise and describe the movement of the cytoplasm as rotating. E.g. the plasma flows around the vacuole in a circle, rotates clockwise or similar.

**Tasks**

Have students observe the plasma movements in an aquatic plant.



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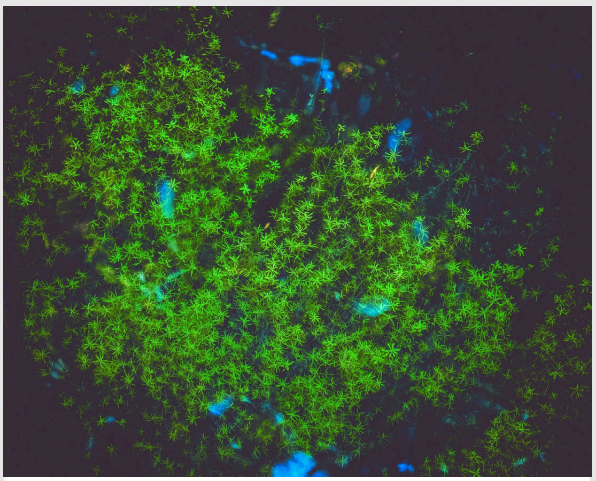
# Other teacher information (3/5)

**Notes on material procurement**

The water plant (Elodea spec.) can either be found in standing water or you can buy it in the aquarium trade as a plant for the aquarium. It can be purchased there at a reasonable price.



The water plant (Elodea spec.)

# Other teacher information (4/5)

**Information on plasma currents**

The cytoplasm of the cell is structured by a protein scaffold, also known as the cytoskeleton. It gives support to the animal cell in particular, which is not supported by the cell wall, and fixes the cell nucleus and some organelles. Transport processes, which can be observed as plasma movements, take place along the fibres of the cytoskeleton. In this process, the protein fibres act like rails on which the organelles are transported with the help of motor proteins.



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# Other teacher information (5/5)

**Notes on implementation**

**Making the preparation**Single-celled algae and somewhat larger sessile organisms also use this aquatic plant as a habitat. The preparations then do not look quite so transparent under the microscope. For this reason the terminal leaves are recommended. They are still fresh and not algal.

**Microscopy**The plasma currents can be observed very soon in healthy, fresh and non-algal plants. If not too many drawings have been made by the learning group concerned, the water pest cell can also be drawn. It is easy to see that a large area of the cell is apparently empty (vacuole) and the chloroplasts are only present in a narrow area (cytoplasm). However, the dynamics of the process can neither be reproduced in the drawing nor in the photo, but can be described in words.

# Safety instructions

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- Working with microscopes for too long can lead to physical discomfort (fatigue, headache, nausea), especially when students are untrained.
- To avoid accidents, scalpels should be checked for completeness at the beginning and end of the experiment.
- Microscopes are sensitive. During transport and handling, care should be taken to ensure that everything is done carefully and without rushing.
- The general instructions for safe experimentation in science lessons to be applied to this experiment.



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# Student Information

## Motivation

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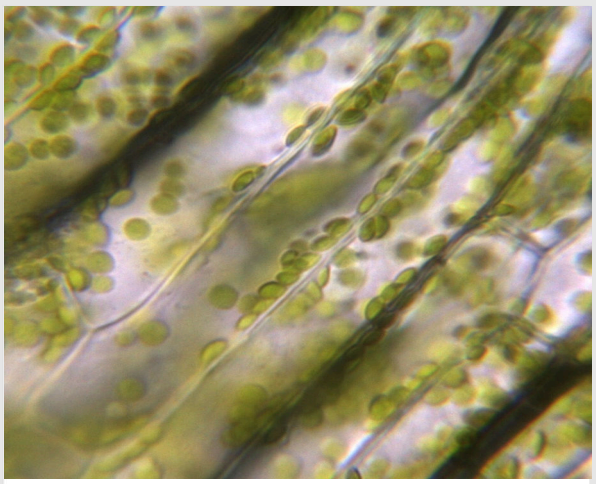

Water plant (Elodea spec.) (100x)

The cell is a reaction space in which a lot is produced and broken down, i.e. in which a lively metabolism takes place. The constant movement of the plasma in which these substances are dissolved ensures the rapid transport of substances.



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# Tasks

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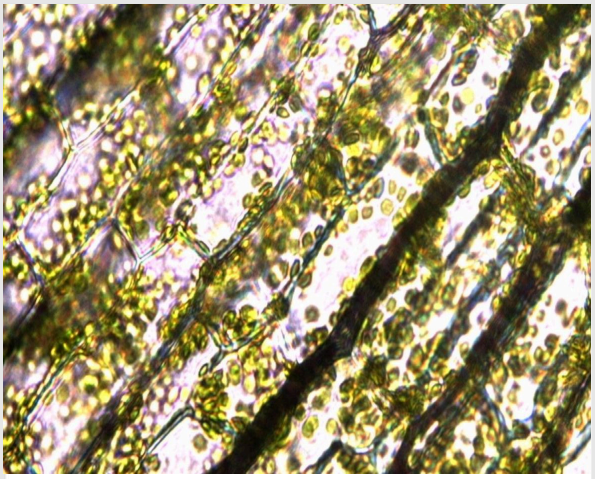

Elodea spec. (400x)

1. Making the preparation
2. Microscopy



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# Equipment

| Position | Material | Item No. | Quantity |
|---|---|---|---|
| 1 | PHYWE Binocular student microscope, 1000x, mechanical stage | MIC-129A | 1 |
| 2 | Microscopic slides, 50 pcs | 64691-00 | 1 |
| 3 | Cover glasses 18x18 mm, 50 pcs | 64685-00 | 1 |
| 4 | Beaker, 100 ml, plastic (PP) | 36011-01 | 1 |
| 5 | Dropping pipette with bulb, 10pcs | 47131-01 | 1 |
| 6 | Tweezers,straight,pointed,120mm | 64607-00 | 1 |



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# Procedure (1/2)

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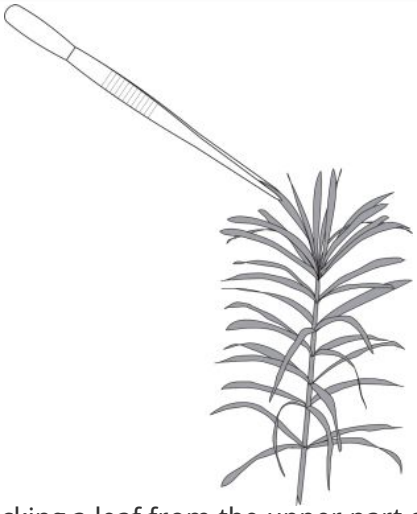
**Making the preparation**

- Prepare a slide with a drop of water.
- Pluck a leaf from the upper part of the plant. The older leaves are overgrown with algae on the outside and are therefore not well suitable.
- The leaf is placed directly into the water drop and covered with the cover glass.



Plucking a leaf from the upper part of the plant

# Procedure (2/2)

**Microscopy**

The cell plasma (cytoplasm) is very pale without staining and therefore hardly observable. The largest space in the cell is occupied by the vacuole anyway. The narrow area of the plasma contains many green chloroplasts that seem to passively float along in the plasma. Thus, the movement of the plasma can be observed indirectly.

- Observe with ascending magnification.
- If possible, observe leaf areas in which there is only one cell layer. This is mostly in the edge area and on the middle rib
of the leaflet.
- You have to give yourself time for the examination. The current is often only visible after a few minutes, when the metabolic processes are activated through the lighting.



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# Report

## Task 1

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Which statement is correct?

- The largest space in the cell is occupied by the vacuole.
- The cytoplasm is motionless.
- The largest space in the cell is occupied by the chloroplasts.
- The cell is divided into many rooms of equal size.



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## Task 2

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Which of the following statements are correct?

- [ ] The cell is a reaction space in which a lot is produced and broken down. It takes place as metabolism.
- [ ] The movement of the plasma is best observed through the green chloroplasts.
- [ ] The cell is actually a dead space in which no biological processes take place.
- [ ] The cytoplasm has a deep red color.

Check

## Task 3

PHYWE

Drag the words to the right places.

The cytoplasm of the cell is structured by a protein scaffold, also known as the _____. Along the fibers of the cytoskeleton, transport processes take place that can be observed as _____. In this process, the protein fibers act like rails on which the _____ are transported with the help of motor proteins.

cytoskeleton
plasma movements
organelles

Check



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# Task 4

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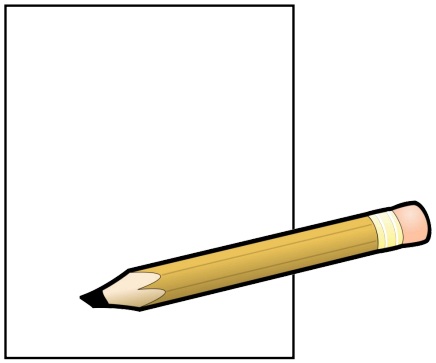
Draw the movement of chloroplasts in the cell.



| Slide | Score / Total |
|---|---|
| Slide 16: The structure of the cell | 0/1 |
| Slide 17: The cytoplasm | 0/2 |
| Slide 18: The plasma movements | 0/3 |

**Total** 0 / 6

Solutions Repeat



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