The cell wall of the onion

Biology	Microscopy / Cell Biology	Basics of Microscopy & Work Technology
Biology	Microscopy / Cell Biology	Plants & Fungi
Biology	Microscopy / Cell Biology	Cell structure
Nature & technology	From the very small & the very big	
Nature & technology	Plants & animals	

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

This content can also be found online at:

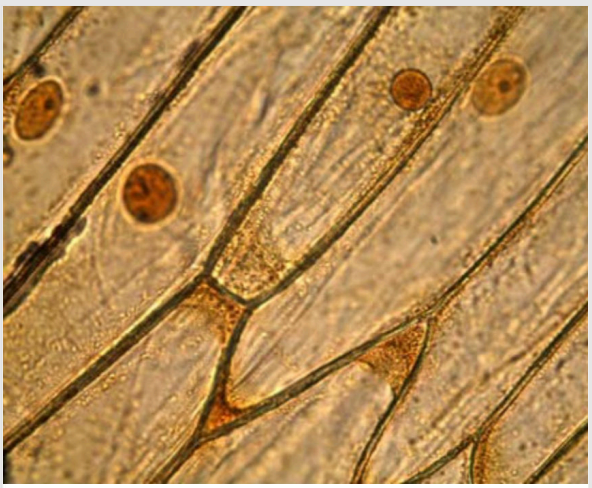
http://localhost:1337/c/5f508d0537ffe20003f10204

PHYWE

Teacher information

Application

PHYWE



Cells of an onion (400x magnification)

With the naked eye we can see the shape of plants and animals and the diversity of these organisms very well. But what they are made up of remains closed to us without any aids. Hundreds of years ago, scientists already tried to explore the structure of organisms with lenses that allowed magnification. The term cell for a closed space was coined by the English scientist Robert Hooke. The year 1838 is regarded as the beginning of cytology. The botanist Matthias Schleiden recognized that plants consist exclusively of cells.

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Other teacher information (1/3)

PHYWE

Prior knowledge

Robert Hooke used a simple microscope to find enclosed spaces in the cork of the cork oak and called them cells (lat. cellula = small chamber). The Dutchman Antonie van Leeuwenhoek was able to achieve a higher magnification with his microscope and discovered bacteria. In 1838 and 1839 Matthias Jacob Schleiden and Theodor Schwann determined the composition of all plants and animals from cells.

Scientific principle

Even a simple transmitted light microscope can be used to examine the structure of a cell, because it allows up to 400 times magnification of an object under examination (= micro-preparation).

Other teacher information (2/3)

Learning objective

The students learn to make a simple micro-preparation and view it under a microscope at different magnifications. A detailed drawing of the microscope image will be made and the cell components will be labeled.

Tasks

1. Production of a micropreparation with subsequent rapid staining
2. Creation of a drawing and labelling of the cell components

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Other teacher information (2/3)

PHYWE

Learning objective

The students learn to make a simple micro-preparation and view it under a microscope at different magnifications. A detailed drawing of the microscope image will be made and the cell components will be labeled.

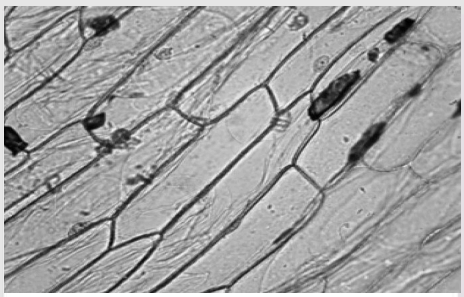
Tasks

1. Production of a micropreparation with subsequent rapid staining
2. Creation of a drawing and labelling of the cell components

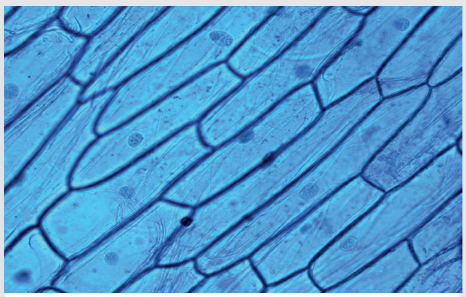
Other teacher information (3/3)

Colouring

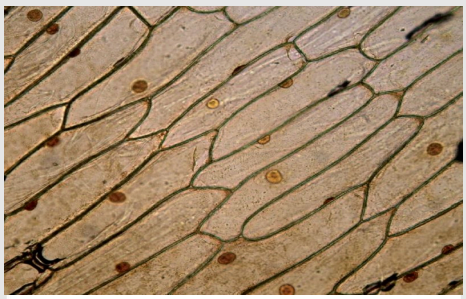
For this preparation, we recommend quick staining with methyl green and Lugol's solution, whereby the effects and advantages of both staining options can be compared.



Without staining (100x)



methyl green (100x)



Lugol solution (100x)

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Safety instructions

PHYWE

- **Methyl green is corrosive.**
- **Put on protective goggles!**

H and P phrases for methyl green

H314: Causes severe skin burns and severe eye damage

H411: Toxic to aquatic organisms, with long-term effects.

P273: Avoid release into the environment.

P280: Wear protective gloves / protective clothing / eye protection / face protection.

P301 + P330 + P331: If swallowed: Rinse mouth. Do not induce vomiting.

PHYWE

Student Information

PHYWE

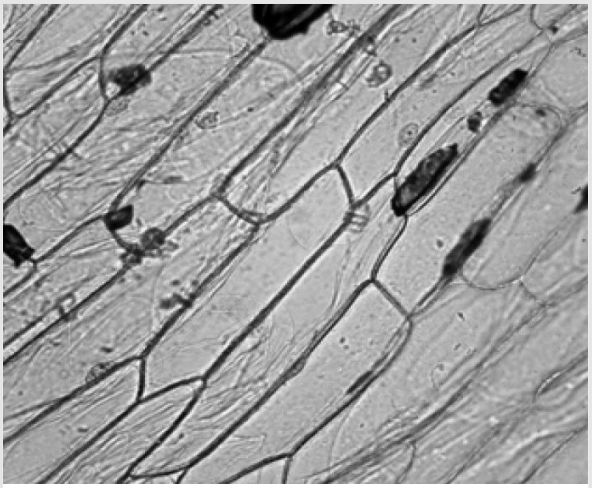
Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Motivation

PHYWE



Cells of an onion
(100x magnification)

In this experiment, you will learn in a simple way and with methods you already know how to create a micro-preparation of plant cells and to look at it under the microscope. With this you can identify the shape of a plant cell, the position of the cell nucleus and other cell components.

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

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
7	Scalpel holder	64615-00	1
8	Scalpel blades,rounded tip,10 off	64615-02	1
9	Knife, stainless	33476-00	1
10	Chemicals set for TESS advanced Microscopy	13290-10	1

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

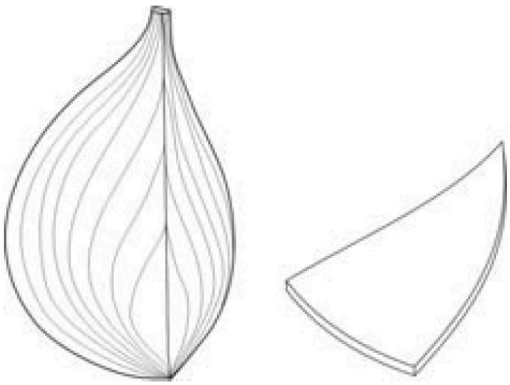
Equipment

PHYWE

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
7	Scalpel holder	64615-00	1
8	Scalpel blades,rounded tip,10 off	64615-02	1
9	Knife, stainless	33476-00	1
10	Chemicals set for TESS advanced Microscopy	13290-10	1

Procedure (1/4)

PHYWE



Make the preparation (1)

One onion is quartered and a single scale is removed.

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

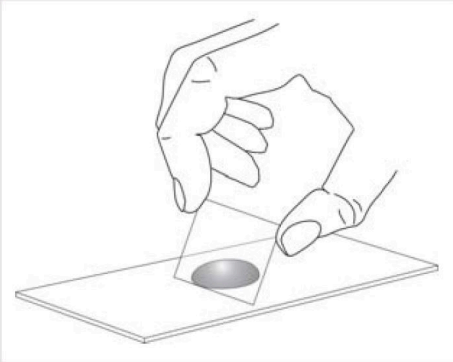
Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Procedure (2/4)

Preparation of the preparation (2)

On the inside of a scale lies the thin, silvery onion skin. Make a 2 x 2 mm incision with the scalpel and place the preparation directly into a drop of water.



Procedure (3/4)

PHYWE

Microscopy

Microscopy with the lowest magnification (40x magnification). When you see a nice cell, you move this interesting spot right in the middle of the field of view. Now set the medium magnification (100x magnification) by turning the revolving nosepiece.

PHYWE

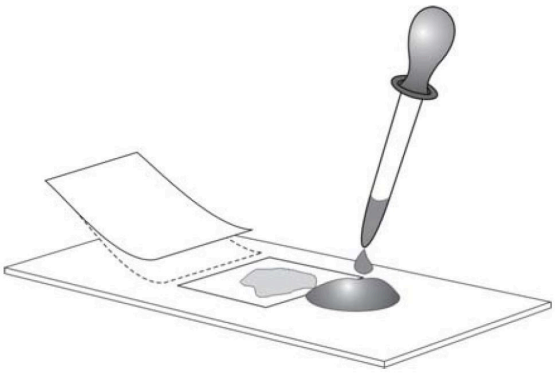
Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Procedure (4/4)

PHYWE



Staining and microscopy again

Pipette a drop of dye solution (methyl green and/or Lugol solution; a micropreparation must be prepared for each dye) next to the preparation and draw it under the cover glass using blotting paper. Microscope again!

PHYWE

Report

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Task 1 + 2

PHYWE

Which cell components can you recognize in your micropreparation?

- [ ] Nuclei
- [ ] Mitochondria
- [ ] Cell walls
- [ ] Chloroplasts

Check

How are the cells in your micropreparation arranged?

- ○ Like a tiled floor
- ○ Like the cells of a tumor
- ○ Like a disorganized cluster of cells

Check

Task 3

PHYWE

Which cell components are not found in plant cells?

- ○ Endoplasmic reticulum
- ○ Mitochondria
- ○ Fat cells
- ○ Golgi apparatus

Check

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

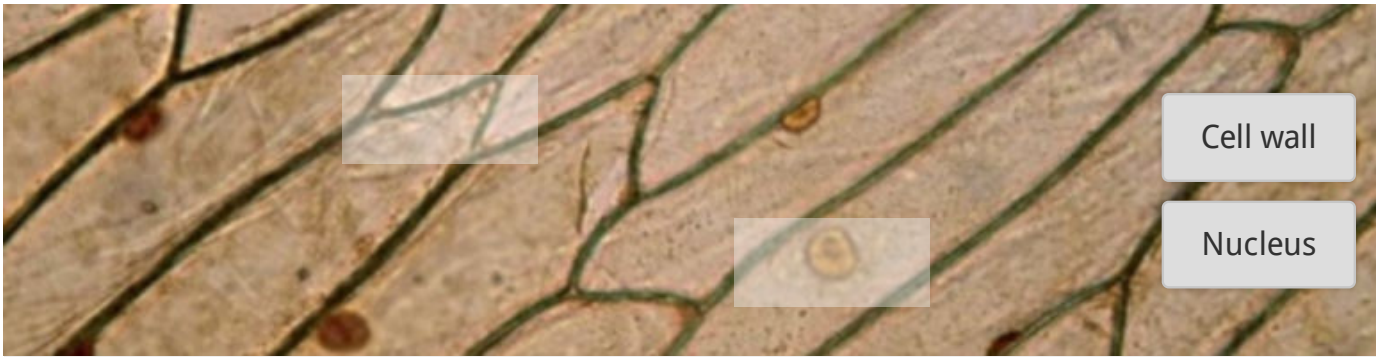
Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Task 4

PHYWE

Magnification of a cell

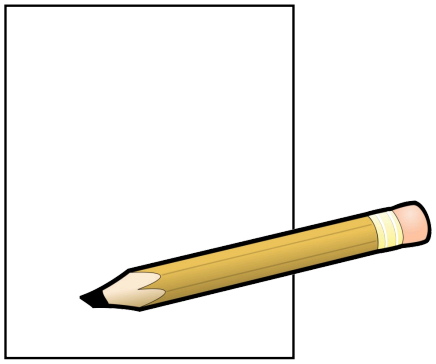


Check

Task 5

PHYWE

Draw a drawing of the stained specimen on a sheet of drawing paper at 100x magnification, i.e. several cells and their arrangement relative to each other. Label the cell wall and nucleus.



PHYWE
Robert-Bosch-Breite 10
37079 Göttingen
Tel.: 0551 604 - 0
Fax: 0551 604 - 107
info@phywe.de
www.phywe.de