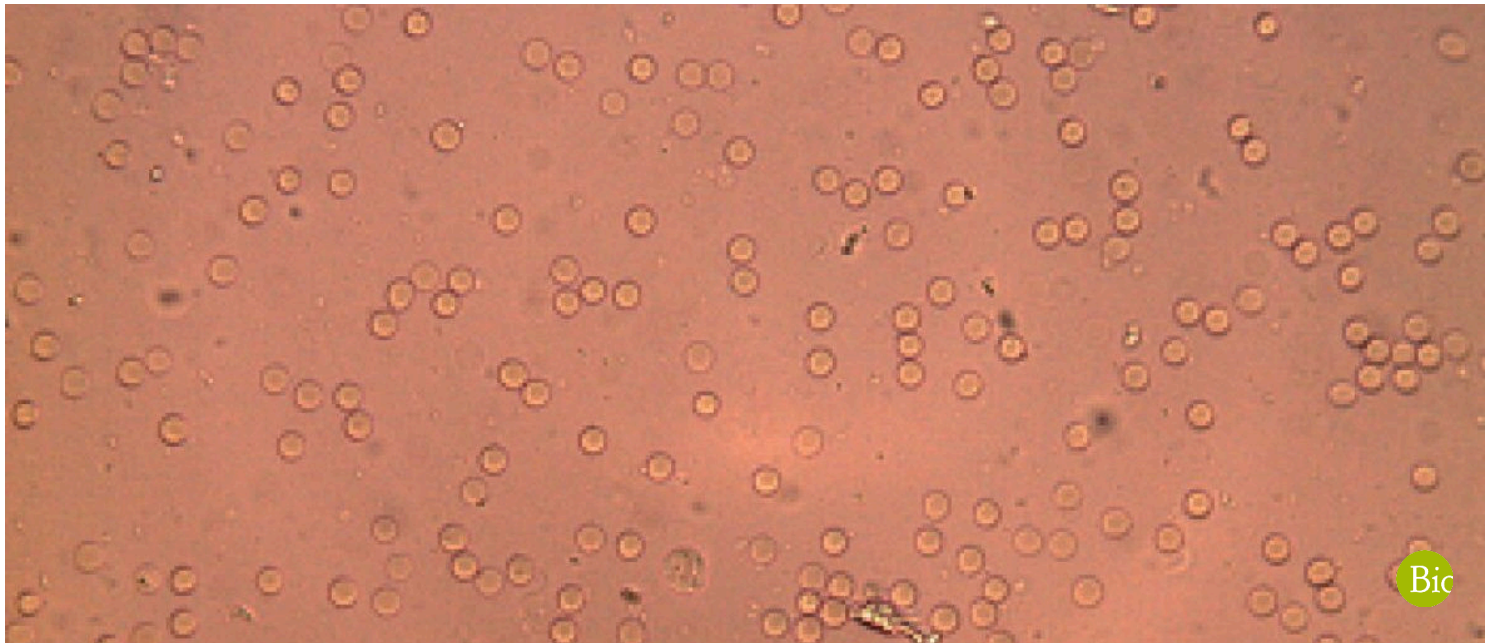






Blood cells

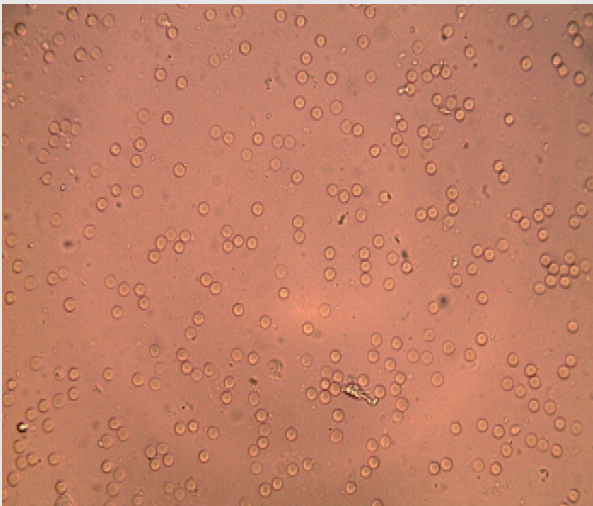


Biology	Microscopy / Cell Biology	Humans & Animals	
Biology	Microscopy / Cell Biology	Cell structure	
Applied Science	Medicine	Histology & Medical Microbiology	
 Difficulty level easy	 Group size 1	 Preparation time 10 minutes	 Execution time 30 minutes

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Teacher information

Application

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Blood (human), 400x, unstained

Each person has 5 to 7 liters of blood that constantly moves in the body. It transports nutrients and heat to all places of need. The blood also has many other functions, e.g. it closes wounds and can kill some pathogens. However, the blood itself can also be a carrier of pathogens (hepatitis viruses and HIV), even if people appear healthy on the outside.

Other teacher information (1/5)

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Previous knowledge



The students should familiarise themselves in advance with the different components of blood. The experiment focuses on the blood cells (red blood cells, white blood cells and platelets), of which the red blood cells dominate in number.

Scientific principle



Students look at blood from different sources under a microscope and can identify the different structures.

Other teacher information (2/5)

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Learning objective



Students should be able to identify and name the structure of blood and its components under the microscope.

Tasks



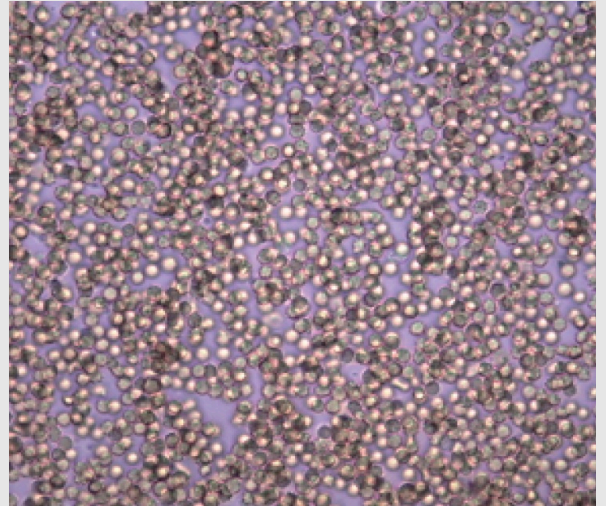
Students will make preparations of blood and visualize individual solid components under the microscope.

Other teacher information (3/5)

Notes on material procurement

Whether human blood may be examined in class depends on the safety regulations of the countries. Any contact with blood can lead to infection with the pathogens of HIV, hepatitis and others. Even dried blood can lead to the transmission of e.g. hepatitis viruses. Therefore, general hygiene rules must be observed in any case.

Alternatively, these tests may be performed with fresh animal blood that has not clotted. It can be ordered from the butcher and must be treated with an anticoagulant (e.g. citrate) by him for these tests.



Blood (mammal), 400x, unstained

Other teacher information (4/5)

Notes on implementation

provide blood:

- **Variante A:** The animal blood treated with citrate is given to the students in small quantities in a beaker. All the following tests can be carried out with it.
- **Variante B:**
 - Isopropanol or ethanol (or a mixture) and swabs (cellulose or similar) should be kept ready.
 - The puncture site must be disinfected before blood is collected and then protected from pathogens (plaster).
 - The haemostilts may only be used once and must then be disposed of in closed containers so that no strangers can be injured or infected.

Other teacher information (5/5)

Notes on implementation

Rapid blood test: A quick examination is necessary because otherwise plasmolysis of the cells will occur. In this examination (without staining) only red blood cells can be seen as round discs. That they are lenticular or plate-shaped can be seen in individual cells if they are transverse. This is only possible with a spacer.

Coloring: Pupils should handle the dyes carefully so as not to soil tables and clothing. It is favourable to work on tiled surfaces with sinks.

Microscopy of the blood smear: By staining, the quite large, diverse white blood cells are stained differently. With a little luck, the irregularly shaped platelets lying in groups can also be recognised.

Safety instructions (1/2)



- Working with microscopes for too long can lead to physical discomfort (fatigue, headache, nausea), especially when students are untrained.
- Direct contact with the blood of strangers must be avoided at all costs.
- Ethanol is very flammable, keep away from open flames!
- Giemsa solution contains methanol. Avoid contact with the skin!
- Put on safety goggles and wear gloves.
- 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 apply to this experiment.

Safety instructions (2/2)

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H and P phrases

Ethanol:

H225: Highly flammable liquid and vapor.

P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. Do not smoke.

Giemsa solution:

H301: Toxic if swallowed.

H311: Toxic in contact with skin.

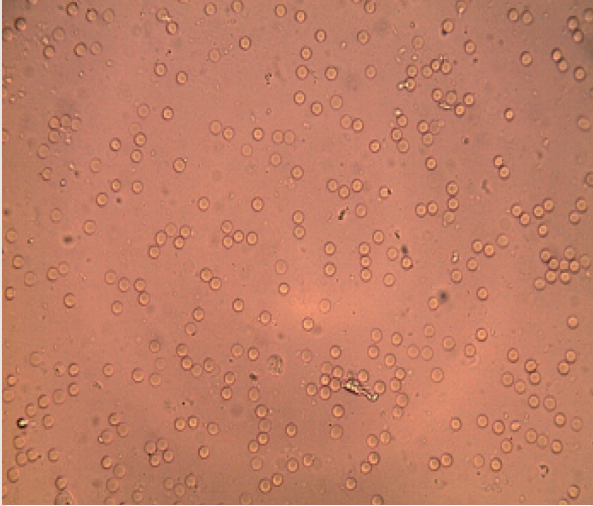
H331: Toxic by inhalation

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Student Information

Motivation

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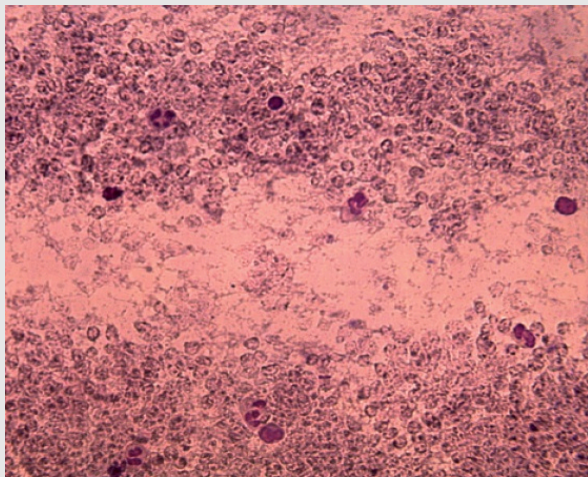


Blood (human), 400x, unstained

Each person has 5 to 7 liters of blood that constantly moves in the body. It transports nutrients and heat to all places of need. The blood also has many other functions, e.g. it closes wounds and can kill some pathogens. However, the blood itself can also be a carrier of pathogens (hepatitis viruses and HIV), even if people appear healthy on the outside.

Tasks

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Blood smear 400x, staining with azure-eosin-methylene blue

The blood appears as a uniform red liquid. Try to make individual solid components visible!

Equipment

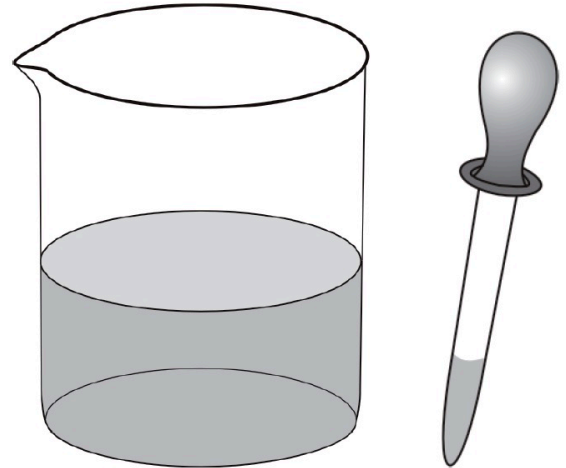
Position	Material	Item No.	Quantity
1	PHYWE Binocular student microscope, 1000x, mechanical stage	MIC-129A	1
2	Microscopic slides, 50 pcs	64691-00	1
3	Cover glasses 18x18 mm, 50 pcs	64685-00	1
4	Beaker, 250 ml, plastic (PP)	36013-01	2
5	Dropping pipette with bulb, 10pcs	47131-01	1
6	Blood lancets, sterile, 200/pkg	64217-00	1
7	Chemicals set for TESS advanced Microscopy	13290-10	1

Procedure (1/3)

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Provide blood

- Variant A: Blood with anticoagulant is provided by the teacher. Prepare the microscope slide etc.
- Variant B: You want to examine your own blood! First clean a slide thoroughly and prepare all materials. Massage the finger intended for blood collection. Disinfect the fingertip with propanol. Take the blood lancet out of the original packaging (use only for this purpose!). Score or prick the finger with the lancet until blood comes out. Discard the first drop and drop the second drop directly onto the slide.



Procedure (2/3)

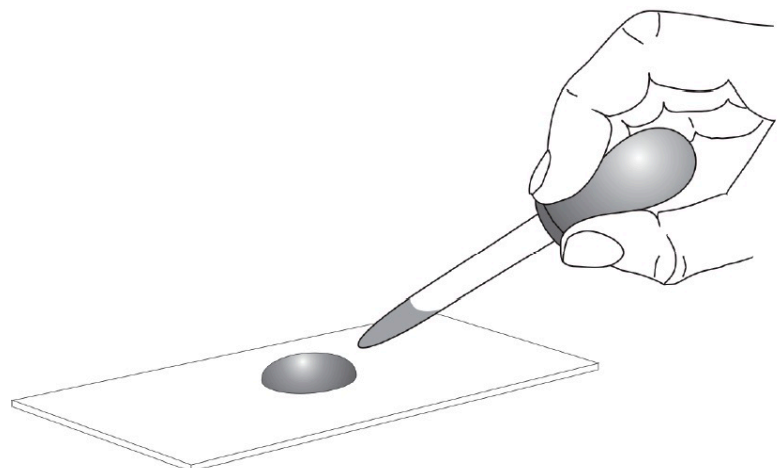
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Rapid blood test

- The blood drop is diluted with water and microscoped very quickly (up to 400x).

Using the coverslip as a spacer between your slide and the coverslip, you can better determine the shape of the blood cells.

Try to recognize! What are the names of the blood cells that you now see in large numbers?



The blood drop is diluted with water

Procedure (3/3)

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Staining of the blood smear

- The slide should be placed on a support for this staining.
- Drop some blood onto the slide as described in 2.
- Next to it put a glass so that it gets contact with the blood and pull it away from the drop. This spreads the blood very thinly and does not destroy the cells.
- Allow to dry for 5 minutes.
- Drop a few drops of Azure-Eosin-Methylene Blue solution on it and leave it for 2 minutes.
- Add a few drops of distilled water and wait 2 to 3 minutes.
- Rinse with plenty of distilled water, allow to dry, microscope.

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Report

Task 1

Drag the words to the right place.

Every person has to liters of blood, which constantly moves in the body. It transports and heat to all places of need. The blood also has many other functions, e.g. it provides for the of wounds and can kill some . But the blood itself can also be a carrier of pathogens (hepatitis viruses and HIV), even if people appear on the outside.

 Check

Task 2

Any contact with blood can lead to infection with the pathogens of HIV, hepatitis and others. Dried blood can also lead to the transmission of hepatitis viruses, for example.

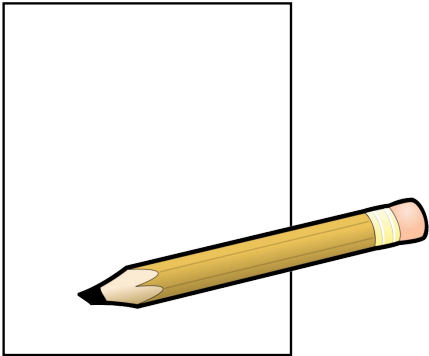
 True False Check

In terms of numbers, white blood cells dominate over red blood cells and platelets.

 True False Check

Task 3

Make a drawing of uncolored blood and name the components.



Slide

Score/Total


Slide 18: Blood

0/6

Slide 19: Multiple tasks

0/2

Total

 Solutions Repeat