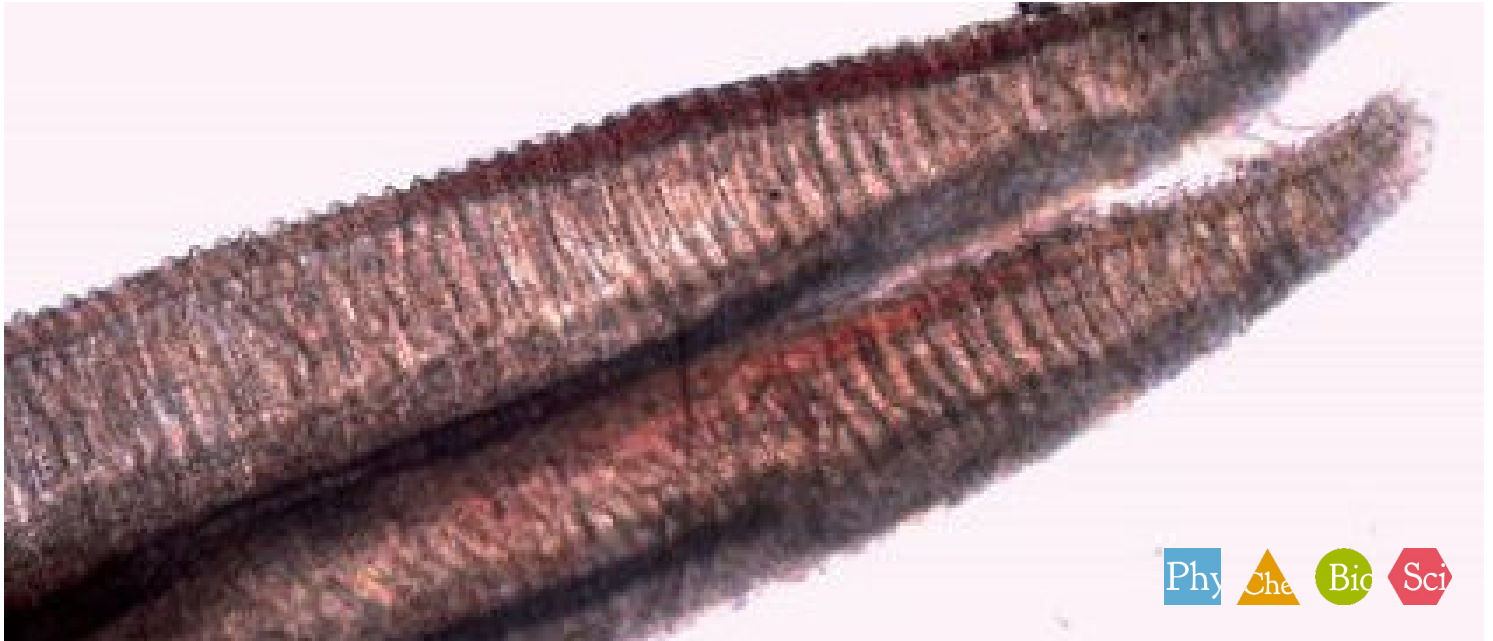


Fish Gills



Biology → Microscopy / Cell Biology → Basics of Microscopy & Work Technology

Biology → Microscopy / Cell Biology → Humans & Animals

Biology → Animal Physiology / Zoology → Fish

Nature & technology → From the very small & the very big

Nature & technology → Plants & animals



Difficulty level

easy



Group size

1



Preparation time

10 minutes



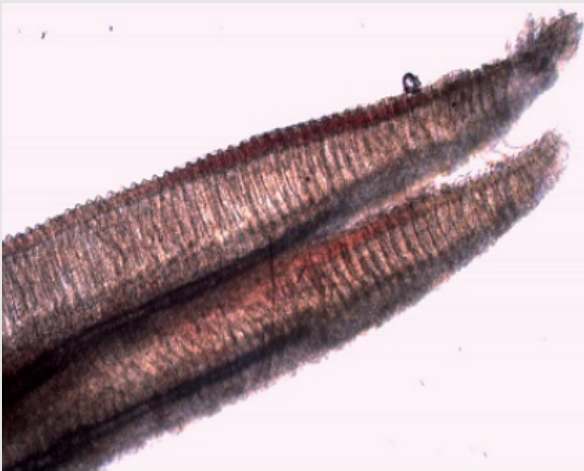
Execution time

30 minutes



Teacher information

Application



Two gill leaflets 40x

Many simply built animals, such as the slipper animal or the earthworm, absorb oxygen for all life processes over the entire surface. In fish, many skin folds, the so-called gills, have formed in the course of evolution. The water flows over this contact surface and the oxygen contained in it migrates through the gill skin into the blood of the fish. The fish breathes.

Other teacher information (1/4)

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Previous



With the help of a model or a cross-sectional drawing, e.g. from a textbook, the students should become familiar with the path of the water through the fish and show it on the fish. It is useful to show the path of the water with an object (pen) in order to perceive the exit (gills). Any feelings of disgust that may exist thus give way to an interested, purposeful investigation and the abstract level is abandoned. If the pupils are already familiar with the respiratory organs of fish, they can describe them comparatively.

Principle



Students look at fish gills under the microscope.

Other teacher information (2/4)

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Learning



The students should recognize the structure of the gills, the gill arch and the gill leaflet and thus understand the function of these body parts. In doing so, they will recognize that the structure of the fish gills results in an increase in surface area.

Tasks

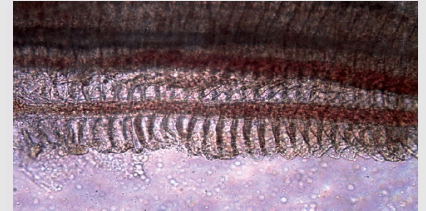


Students will dissect and microscope gills, gill arches, and gill leaflets.

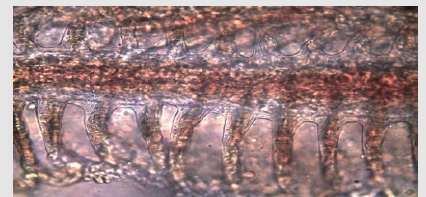
Other teacher information (3/4)

Notes on material procurement

Fresh fish can be obtained from an angler or at the fish counter in the supermarket. In principle, all fish are suitable for preparation if they have a minimum size of approx. 10 cm so that they can also be examined macroscopically. If you have anglers in the class, they can prepare a frozen stock.



Gill leaflets 100x



Gill leaflets 400x

Other teacher information (4/4)

Notes on implementation

expose gills: Here the students have to cut vigorously for the first time, which may cost overcoming. The gill clasps consist of a bony substance.

The gill arch The pupils can recognise all the components of the bow on the white background. Depending on the didactic orientation, the parts gill trap and gill arch can also be named and explained. By drawing the macroscopic structure, an idea of the surface enlargement is introduced.

Microscopy of the gill leaflets: Students should articulate the different observations in the ascending magnifications (including magnification with a magnifying glass). The main cognitive learning objective of this lesson: students will recognize the principle of surface area magnification. More contact or reaction surface area can produce higher performance. This principle can be transferred to other areas (alveoli, chloroplasts).

Safety instructions

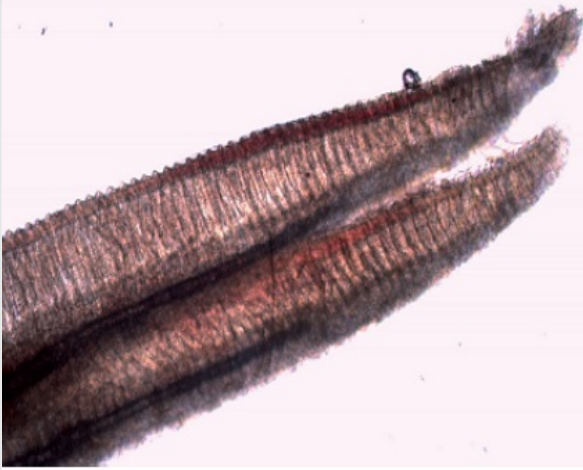
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- Working with microscopes for too long can lead to physical discomfort (fatigue, headache, nausea), especially when students are untrained.
- Attention! The number of scalpels should be checked after every hour to avoid accidents!
- Microscopes are 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.

Student Information

Motivation

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Two gill leaflets 40x

Many simply built animals, such as the slipper animal or the earthworm, absorb oxygen for all life processes over the entire surface. In fish, many skin folds, the so-called gills, have formed in the course of evolution. The water flows over this contact surface and the oxygen contained in it migrates through the gill skin into the blood of the fish. The fish breathes.

Tasks

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Prepare gills, gill arches and gill leaflets. Explore and, if necessary, microscope the preparations. Do you recognise the principle of surface enlargement?

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	Scissors, straight, pointed, l 110mm	64623-00	1
5	Magnifier, plastic, 5x, d=35mm	88002-01	1
6	Tweezers, straight, pointed, 120mm	64607-00	1

Procedure (1/2)

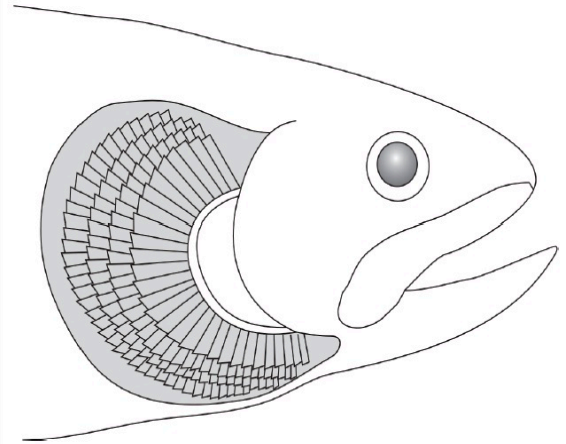
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Expose the gills

- The gills are protected from the outside by the gill cover. Remove the lid with the dissecting scissors. Now you can see the gill arches.

The gill arch

- Prepare a complete gill sheet. Place the sheet on a white surface and examine it closely with the magnifying glass.



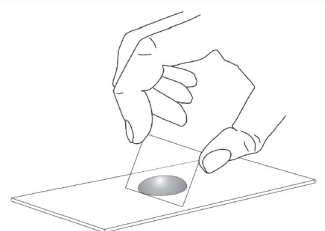
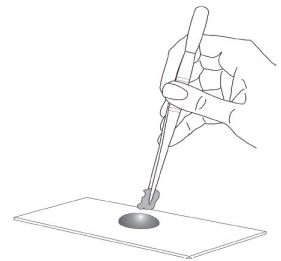
Seat of the gills

Procedure (2/2)

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Microscope a gill leaflet...

- At the gill arches there are many thin membranes, the gill leaflets. Try to recognize the blood vessels under the microscope!
- Cut off a small piece of the gill skin with the dissecting scissors and place it in the water drop.
- Microscope gradually up to the highest magnification and draw in detail the gill leaflets in the record.





Report

Task 1

Choose the correct answers.

- Fish absorb water through their gills and release it through their mouths.
- Fish take in water through their mouths and release it through their gills.
- The structure of the gills causes an enlargement of the surface, whereby more oxygen can be taken up.
- The structure of the gills causes a surface reduction, whereby more oxygen can be taken up.

Check

Task 2

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The gill clasps are very soft and easy to cut.

 True Incorrect Check

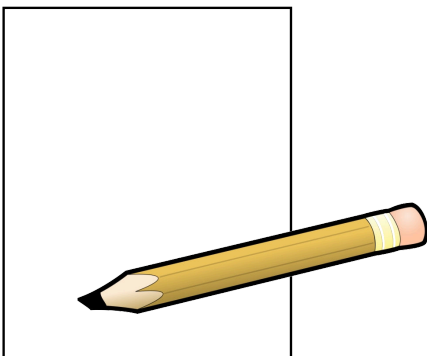
In the course of evolution, fish have formed many skin folds, the so-called gills. The water flows over this contact surface and the oxygen contained in it travels through the gill skin into the fish's blood. The fish breathes.

 True Incorrect Check


Task 3

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Draw in detail gill arches and gill leaflets and label them.



Slide	Score/Total
Slide 15: Fish	0/2
Slide 16: Multiple tasks	0/2

Total  0/4

 Solutions

 Repeat