The spore capsules of ferns (Item No.: P1444201)

Curricular Relevance

Area of Expertise:	Education Level:	Topic:	Subtopic:	Experiment:
Biologie	Klasse 7-10	Biologie der Zelle, Mikroskopie	Samenpflanzen, Farne, Pilze	Sporenkapseln am Farn

Difficulty	Preparation Time	Execution Time	Recommended Group Size
Easy	10 Minutes	30 Minutes	1 Student

Additional Requirements:

- Fern frond with spores
- Water

Experiment Variations:

Keywords:

Task and equipment

Information for teachers

Information

Weedy fern plants are often found in moist forests. In the tropical regions, however, there are even tree ferns that can grow up to be 10 meters tall. The ferns do not belong to the flowering plants and therefore do not produce any seeds. Like the mosses, they reproduce by spores.
On the underside of a frond (the leaf), there are small aggregations of spore capsules (sori). They show a regular arrangement and a species-specific pattern. The fern expert is able to identify a species on account of this characteristic pattern.

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Information on obtaining materials

Ferns can be obtained either from a near forest or a gardener’s shop. If possible, tender-leafed plants should be selected. The rather robust leathery exemplars used as indoor plants are not appropriate as it will turn out difficult to make thin sections from them. Naturally, the plants should possess sori on the underside of their fronds, which is not always the case in all plants. Another possibility consists in collecting a dry stock during the summer. The dried material must be immersed in a mixture of glycerin and ethanol for several hours before sections are made.

Information on ferns

Ferns are historically old plants which have contributed essentially to the formation of carbon deposits.
From the perennial roots the young leaf grows, furled like the scroll of a violin. The sori then emerge on older leaves. The spores are hurled, in part, very far away and germinate on a suitable moist substrate to yield a prothallium which bears the male and female reproductive organs. A new fern then develops from the fertilized egg cells.

Safety measures

- Raw alcohol (methylated spirit) is highly flammable. Extinguish all open flames!
- Wear protective glasses!

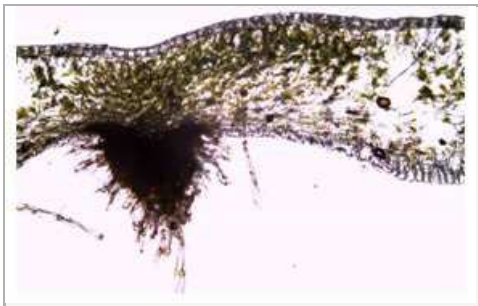
Hazard and Precautionary statements

Ethanol:

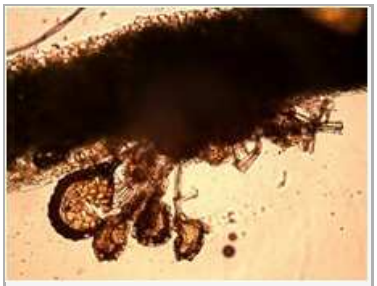
H225:	Highly flammable liquid and vapour.
P210:	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

Information on how to proceed

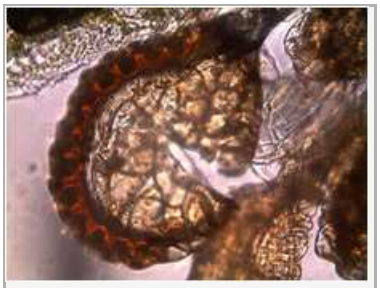
ad 1: Preparation of an ethanol-water solution
Air bubbles quite often become entrapped in the rather dry mountings and are very disturbing. The mounting medium will virtually “crawl” into these cavities if a little ethanol is added.
ad 2: Sections
The specimen is place directly into the mounting medium so that it is thoroughly soaked prior to making sections. A scalpel which is as sharp as possible should be used. Numerous sections which the students shall systematically browse through will be necessary in order to find a good cross-section showing the spore capsules.
ad 3: Microscopy and drawing
The students are supposed to have seen the arrangement of spore capsules on at least one slide of one classmate. It suffices to reproduce one single spore capsule in the drawing.



Section: fern frond with sorus, 100xThe leaf structure is visible in this rather thin cross-section. The thin stalks of the spore capsules break off easily, so that only the arrangement can be seen as an aggregation (sorus).



Sorus with spore capsules, 100x



Spore capsule, 400x

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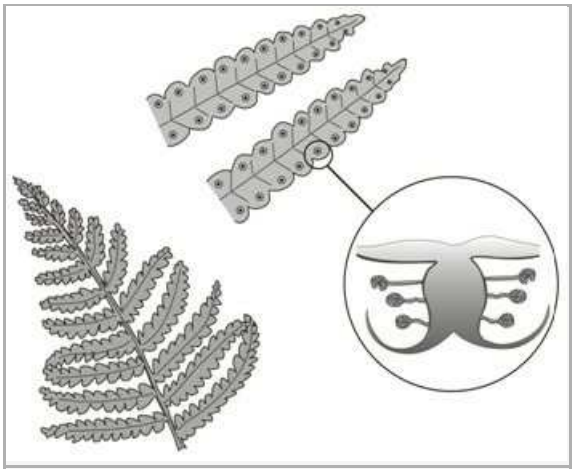
Task and equipment

Task

Examine the spore capsule of a fern plant!



Equipment

Position No.	Material	Order No.	Quantity
1	Euromex BioBlue BB.4250 microscope	EUR-BB-4250	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	Scalpel holder	64615-00	1
6	Scalpel blades,rounded tip,10 off	64615-02	1
7	Tweezers,straight,pointed,120mm	64607-00	1
8	Dropping pipette with bulb, 10pcs	47131-01	1
9	Beaded rim glass, 30 x 50 mm	33624-01	2
10	Chemicals set for TESS advanced Microscopy	13290-10	1

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Set-up and procedure

Safety measures

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Information

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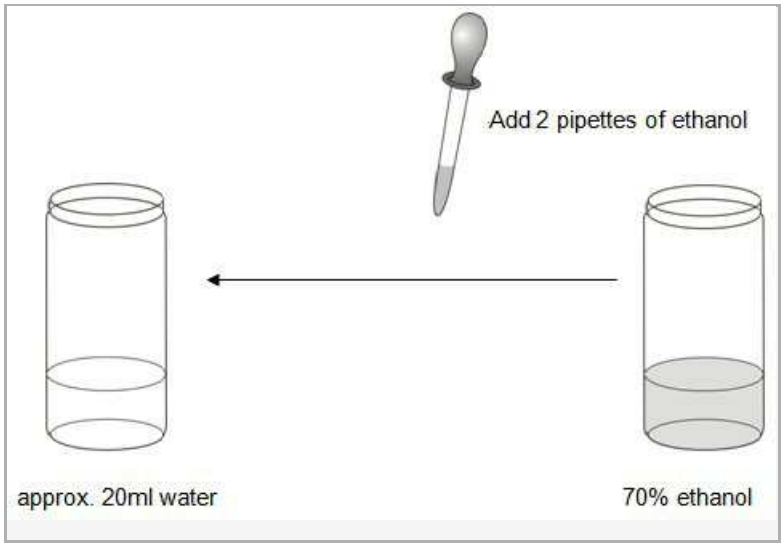
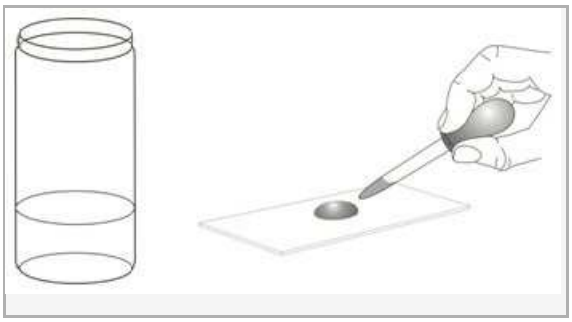
Methods and observations

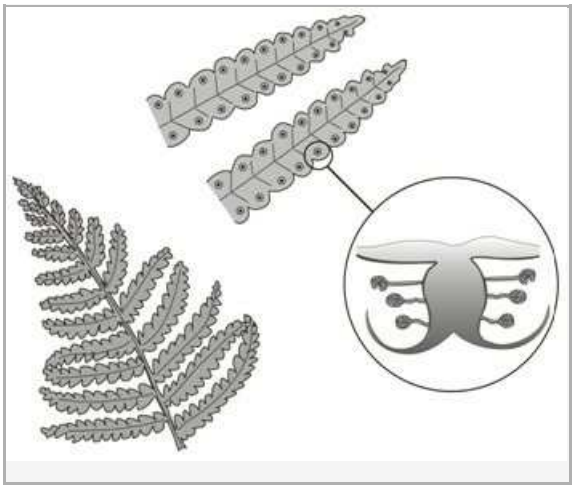
1. Preparation of a mixture of ethanol and water
When mounting spore aggregations on a slide, air bubbles are easily entrapped and prevent viewing the specimen. You should use a mixture of water and ethanol as a mounting and microscopy medium to prevent air entrapments.



2. Sections
Apply the solution to the slide and make numerous very thin cuts through the leaf containing the sori immersed in it.



3. Microscopy
Use the water-ethanol solution for microscopy as well. Examine your sections under the microscope with lowest power and select an appropriate section of the specimen.
Make a drawing of an individual spore capsule in the report!



Report: The spore capsules of ferns

Result - Observations

Make a drawing of an individual spore capsule.

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