Fruit nodes in cross-section

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/6128ad6f4839a1000394dbb1

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Teacher information

Application

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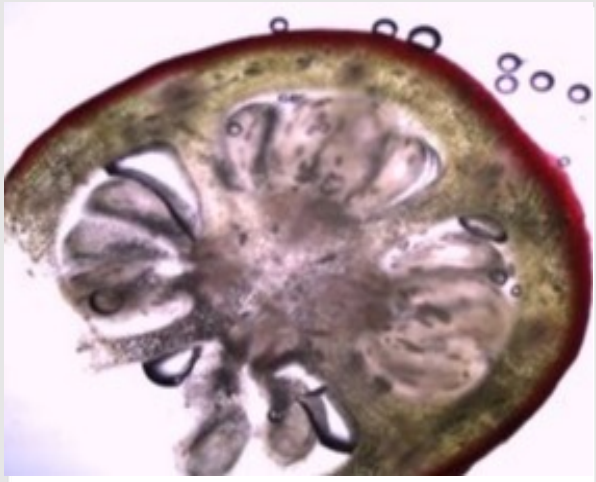

ovary of fuchsia (40x)

Flowers are available in an unmanageable variety. In nature, in the garden or in the flower shop you will find flowers in all colours. The parts of the flower that are so visible to us are the petals. They are mostly used to attract animals. Other parts of the flower are important for the formation of seeds. The male reproductive organ is the stamen (staminum) with the yellow pollen and the female reproductive organ is the carpel, which is located in the middle of the flower. The upper part of the carpel is the pistil, which holds the pollen. The lower part is thickened and is called the ovary. It contains the ovules. Often several carpels are fused together.

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Other teacher information (1/4)

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Prior knowledge

Students should already know the structure of flowering plants and their sexual dimorphism. They should also be able to name the individual parts of the carpel and identify the ovary with certainty.

Scientific Principle

Using a microscope, students look at the ovaries of flowering plants.

Other teacher information (2/4)

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Learning objective

Students should be able to identify the structure of the fruit node under the microscope and then draw it.

Tasks

The students should make a preparation of the ovary and examine it first with the magnifying glass and then with the microscope.

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Other teacher information (3/4)

Notes on material procurement

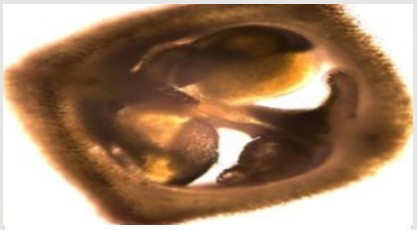
For these exercises are well suited flowers of medium size. Too large ovaries can only be viewed with a magnifying glass (Tulip, Amaryllis). Flowers that are too small (Tradescantia) cannot be prepared well. It makes sense to look around for usable material in a flower or vegetable garden. Single-bodied flowers are better than cultivated, double varieties often sold in flower shops. Some examples:

- Rocket (Eruca sativa) Fam. Brassicaceae contains 2 fused carpels with 2 seeds each.
- Bean (Phaseolus) Fam. Fabaceae has 1 carpel (this also applies to vetch, lupine).
- Tulip (Tulipa), amaryllis, snowdrop (Galanthus) and other representatives of the Liliideae have 3 fused carpels.
- Fuchsia Fam. Onagraceae has 4 carpels.

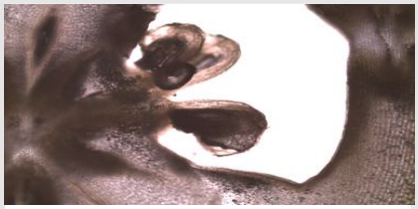
Other teacher information (4/4)

Information on fruit leaves

The carpel consists of the pistil at the top and the lower, thicker part, the ovary. The ovary contains the ovule (megasporangium) with the egg cell. The embryo develops from this after fertilisation. The seed develops from the tissue of the ovule and the embryo. A flower may have one or more carpels. If there are several carpels, they may be fused or single. The number is typical for the species and often also for the family.



Rocket fruit leaf (100x)



Amaryllis fruit leaf (40x)

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Safety instructions (1/2)

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- Working with microscopes for too long can lead to physical discomfort (fatigue, headache, nausea), especially when students are untrained.
- Attention. To avoid accidents after the lesson, check the number of scalpels at the end of the lesson!
- Ethanol is very flammable, keep away from open flames!
- Put on protective goggles!
- 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.

Safety instructions (2/2)

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H and P phrases

Ethanol:

H225: Highly flammable liquid and vapour

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

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Student Information

Motivation

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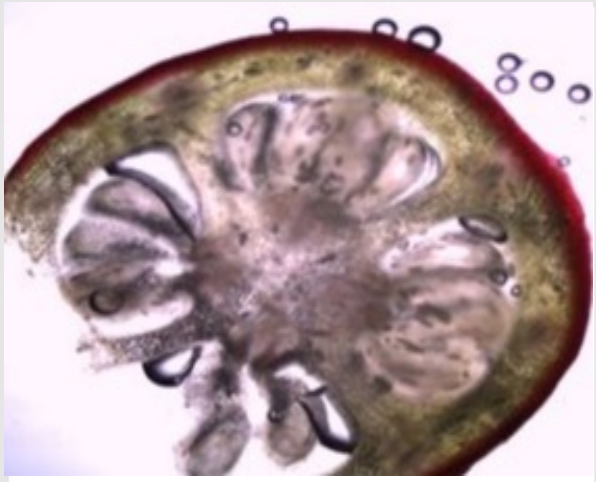

ovary of fuchsia (40x)

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Tasks

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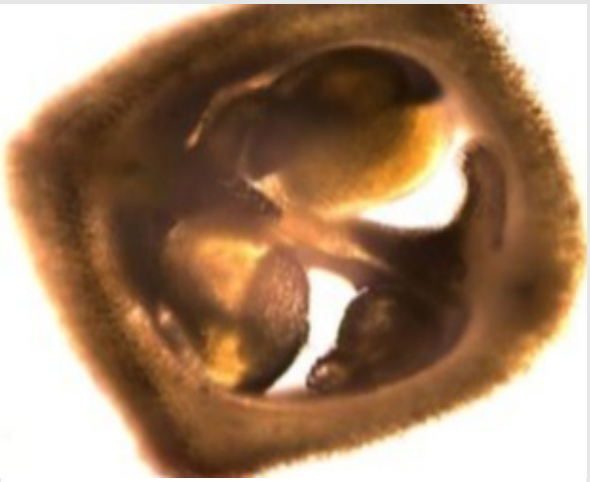

Fruit node of arugula (100x)

1. Preparation
2. Making the preparation
3. Examine the specimen with a magnifying glass and microscope

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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
7	Scalpel holder	64615-00	1
8	Scalpel blades,rounded tip,10 off	64615-02	1
9	Magnifier, plastic, 5x, d=35mm	88002-01	1
10	Chemicals set for TESS advanced Microscopy	13290-10	1

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Procedure (1/2)

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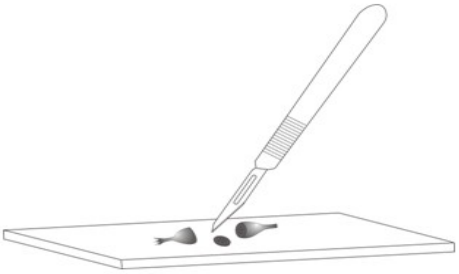
Preparation

Repeat your knowledge of the structure of the flower. Look at drawings to identify the carpel (pistil) with pistil and ovary on the real flower.

Making the preparation

- Prepare the microscopy liquid: Add a few drops of ethanol to the water. This will slightly displace the air in the ovary. Prepare the microscope slide.
- Remove all flower parts that do not belong to the carpel.
- Prepare thin sections and place them directly into the microscopy liquid.



Procedure (2/2)

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Examine the preparation

Magnifier:

Some cross-sections will be too large in diameter for the microscope, but even with small flowers you can use the magnifying glass to get an overview first. How many carpels can you see?

Microscope:

- Microscope at lowest magnification.
- Count the carpels.
- Draw an ovary in cross section in the protocol.

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Report

Task 1

Drag and drop the correct words into the spaces provided

The male reproductive organ is the _____ (staminum) containing the \yellow pollen and the female reproductive organ is the _____ (carpel) located in the _____ of the flower. The upper part of the carpel is the _____, which picks up the pollen. The lower part is thickened and is called the _____ (ovary). It contains the _____.

stamen
middle
pistil
fruit node
carpel
seed plants

Check

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Task 1

PHYWE

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stamen
middle
pistil
fruit node
carpel
seed plants

Check

Task 2

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Often several carpels are fused together. The number of carpels is typical for the species and often also for the family.

○ True ○ Incorrect

Check

Ethanol can be treated like water: It is completely harmless and non-flammable.

○ True ○ Incorrect

Check

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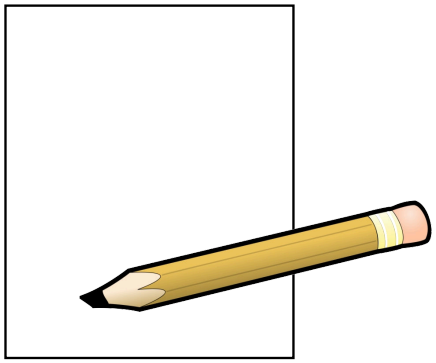
Task 3

Draw and label an ovary in cross section.



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