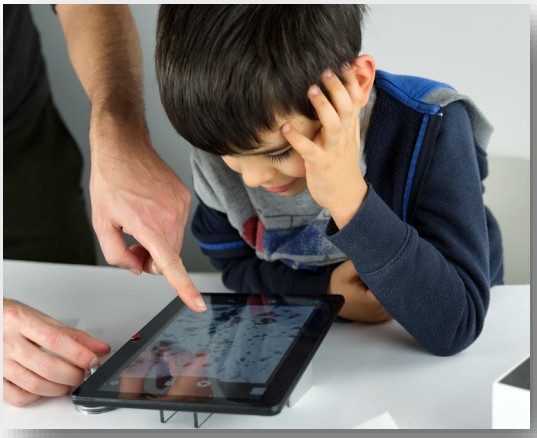
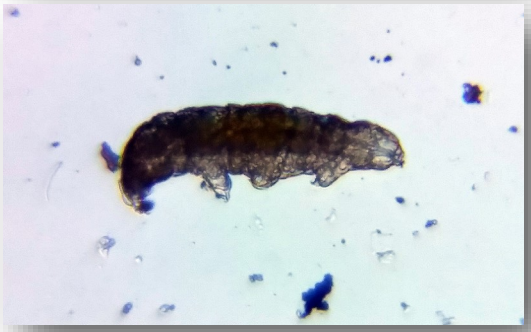
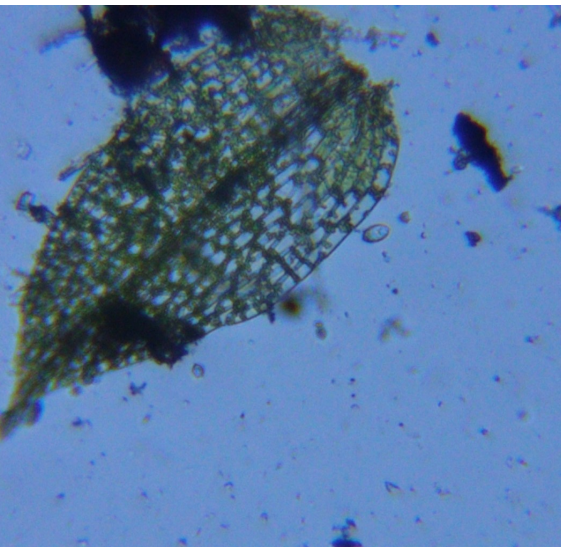




blips

magnify the world

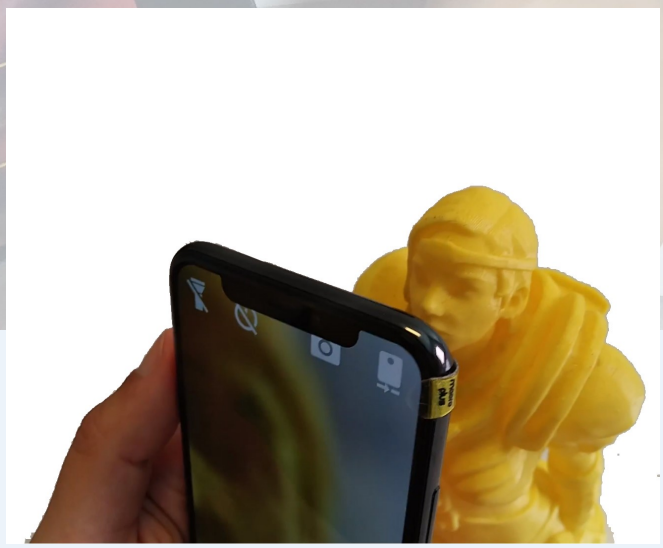
Workshops and Experiments



SMO
SMART MICRO OPTICS

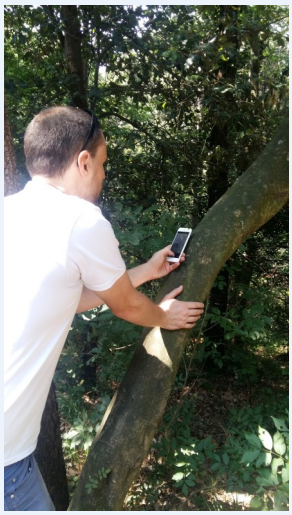
MACRO OBSERVATIONS

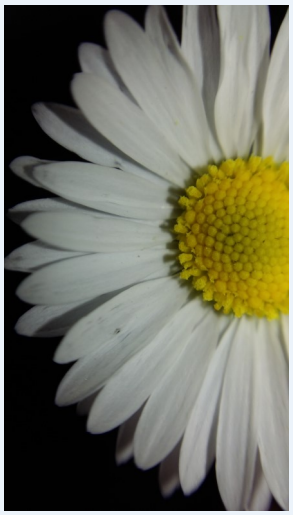
The macro photography experiences you can do with Blips lenses are numerous and easy to prepare. The lenses suitable for this type of experiments are the Macro Plus (5x) and the Macro (10x), both suitable for hand-held use.

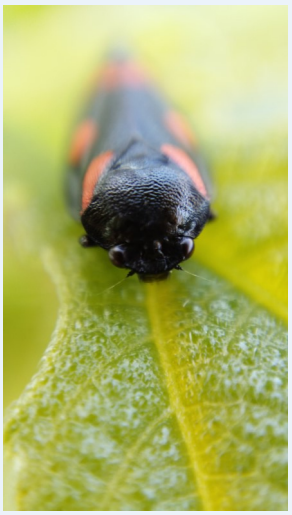


The subjects you can observe are the most disparate: from the external structures of plants (bark, leaf pots, flowers...), the hidden details of mushrooms, the observation of small moving animals (insects or centipedes, for example, are excellent subjects). Even the static objects, however, reveal surprising secrets if observed from very close: you can study the quality of the 3D printing processes, the details of prints on paper, the textures of fabrics and the particulars of wood.

The Macro and Macro Plus lenses from Blips are the ideal solution for outdoor experiences of various kinds, such as small explorations in the undergrowth or in a flowering meadow. Thanks to their extreme portability, the lenses can always be carried with you: the protective card is roughly the size of a credit card and can be kept in your wallet, to explore the micro world anytime you want.







MACRO-PHOTOGRAPHY EXPERIENCES

FLOWERS

Difficulty: easy

Duration: few minutes

Materials:

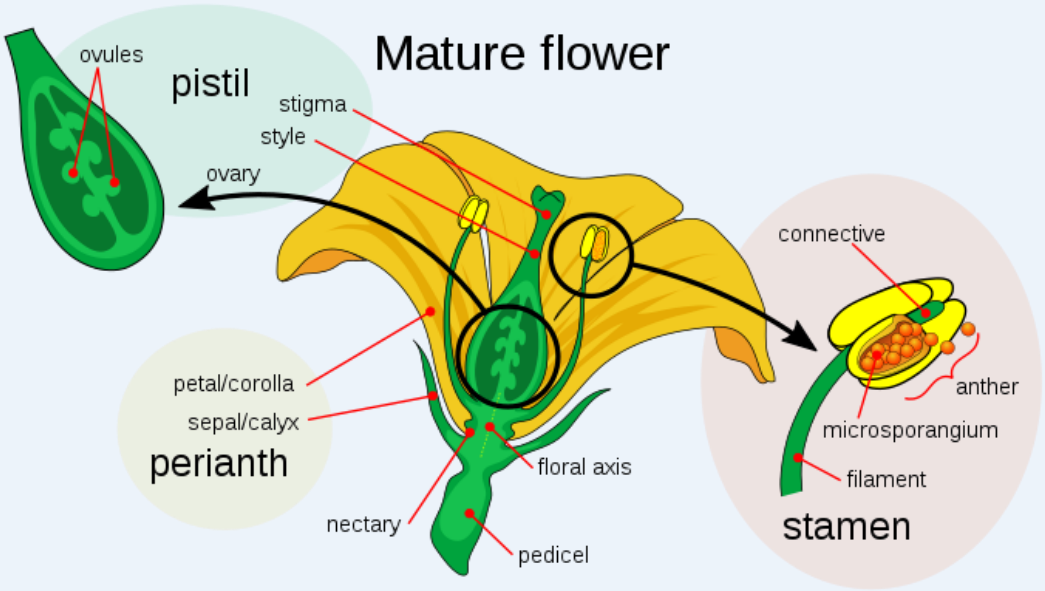
- **Blips Macro kit**
- **Fresh flowers**

Observed subjects:

- **Internal parts of flowers**

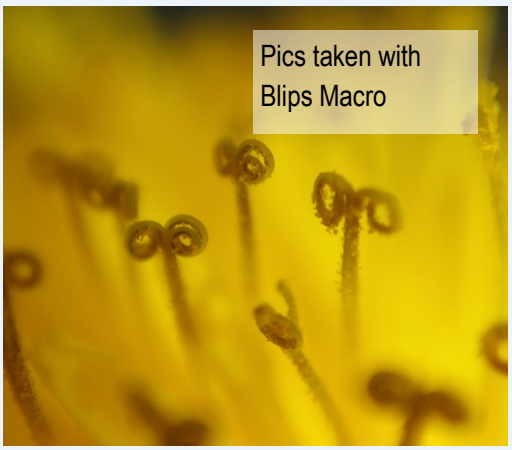
Procedure:

To observe the internal parts of flowers, you have to use fresh, undamaged samples in bloom. If necessary, you can gently open the flower, removing some petals to get near the internal parts of the flower.



Description:

The structures are easily recognizable in many of the common flowers in commerce or even in spontaneous species (like, for example, dandelions). You can recognize the various internal parts of the flower, identify the differences between species and species and discover details hidden or invisible to the naked eye, such as the pollen dots still attached to the stamens. On the bottom of the stigma it is usually found a round structure which is the ovary. Inflorescences, like daisies, are made of many tiny flowers with a modified structure. Observing them from very close, you can distinguish all single elements.



INSECT LEG

Difficulty: easy

Duration: few minutes

Materials:

- **Blips Macro kit**
- **Prepared slide with insect leg or a static insect (dead/numb)**

Observed subjects:

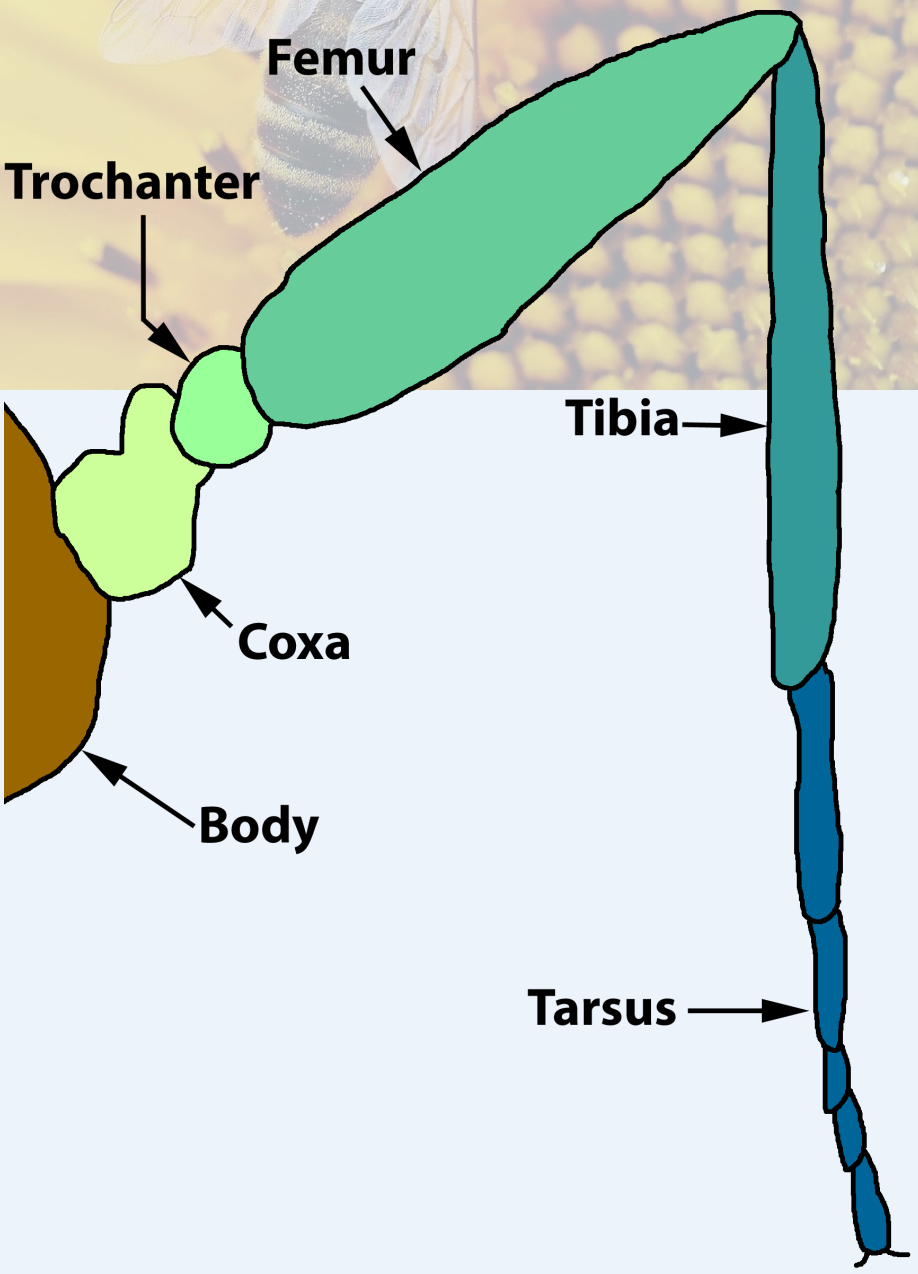
- **Anatomical parts of insects**

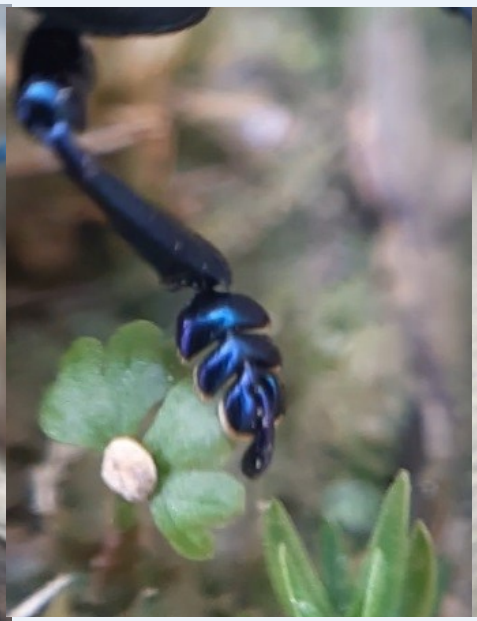
Procedure:

To check these structures, the sample must be dead or not moving. Do not try to extend the sample leg with tweezers, since dead insects are usually fragile and can easily break.

Description:

All insects have a fixed number of segments for each of their legs. These segments are called, respectively, coxa, trochanter, femur, tibia, tarsus and pretarsus. They are perfectly distinguishable in most species, and their structure is often a characteristic trait of insect groups.





INSECT COMPOUND EYE

Difficulty: easy

Duration: few minutes

Materials:

- **Blips Macro kit**
- **Static insect (dead/numb/slowly moving)**

Observed subjects:

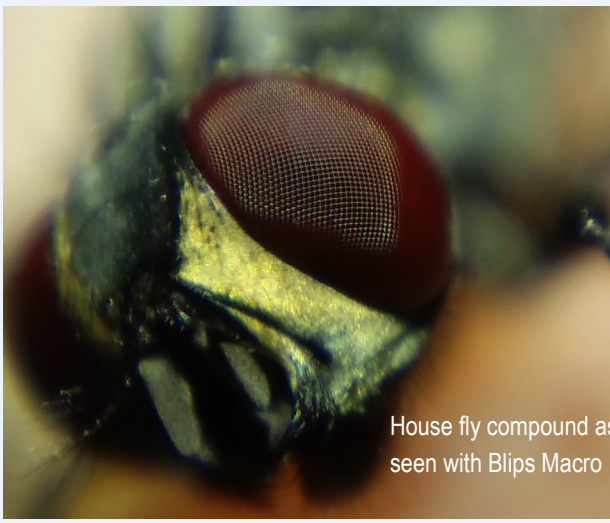
- **Anatomical parts of insects**


Horsefly compound eye

As seen with Blips Macro Plus

Procedure:

To check the eyes of insects, you have to get near the subject avoiding it to move, as far as possible. You can use natural light or the device led, in order to make the single elements of the eye provide a small reflection which makes them more distinguishable.

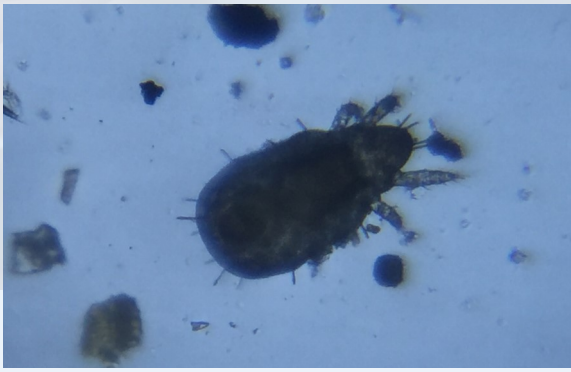

House fly compound as
seen with Blips Macro

Description:

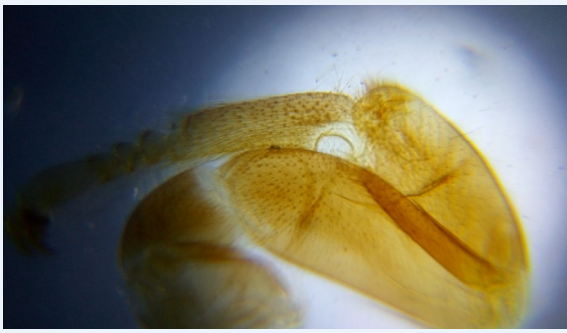
Insects, as all arthropods, have compound eyes. Their single units are called ommatidia (singular: ommatidium). They are simple structures that can be distinguished with a small magnification. In some groups of moths and dragonflies these elements can reach a number of 30.000 units per eye.

MICROSCOPY EXPERIENCES

Blips Labkits offer a first glimpse into the world of microscopy. Transforming your smartphone or tablet into a digital microscope, you can take videos and pictures of the micro-world, ready to be saved and shared.
The simplest way to learn how to use Blips Labkits is practicing with prepared slides. We offer a great variety of subjects in the field of zoology, botany and histology. Getting the perfect focus and scanning the subject on a prepared slide is the best way to gain skill in using the system. From there, you can create your own samples on plain slides.



The first thing to know before creating your own slides is that all samples must be thin. Thick samples usually obstruct the transmission of light, delivering dark images. The best way to get transparent samples is to use a small drop of water on the sample and cover it with a cover slip. Thanks to the liquid tension of water, the cover slip keeps everything flat and suitable for microscopic observation. Cover slips are a good solution but they are not necessary in every single case: sometimes samples are naturally flat and do not need any help to stay flat.



When observing biological live samples, a staining system can be useful for the experience, making subjects more viewable. Among the most common staining systems for microscopy there are iodine (which is used, for example, to observe starch in potatoes) and methylene blue (which colors membranes and nuclei of animal cells), but there are lots of other stains, specifically studied for different purposes and subjects. Use the proper dilution, which is, in most cases, very high. Follow the instructions on the stain bottle for the correct dilution.
A common technique used to properly stain a plain slide with specimen, a drop of water and a cover slip on top of the specimen, is to place a drop of stain on the edge of the cover slip itself. On the opposite side of the cover slip you must place a paper towel or cloth to draw the liquid out from the cover slip. As the liquid is drawn out, the stain will be pulled in under the cover slip, staining the subject.

The range of magnification provided by Blips Labkits starts from around 20x up to 130x-150x, depending on the device optical features. The resolution provided by the Blips Ultra lens is less than 3.5 microns in transmitted light. With this resolution, you can easily find many of the most interesting inhabitants of the micro-world.
A good alignment of the light source under the lens and a correct setting of the distance between lens and sample are fundamental conditions to get the best performance from the system.
All experiences are suitable for children, starting from an age of 8 (with the help from an adult). The Blips kits are not toys, but they can be used as powerful tool for Science teaching an for discovering the microscopic world at any age.

METHYLENE BLUE STAINING

One of the most common dyes for microscopy is methylene blue, which enhances the viewability of animal cells, coloring cell membranes and nuclei with an intense blue color. It requires a strong dilution in tap or distilled water, usually 1/10 or more (depending on concentrations). It is harmless but it is usually very dense, so be careful not to stain hands or fabrics, since they are difficult to clean up. After coloring your sample, wait 3-5 minutes for it to get the proper coloration.

MOSS

Difficulty: medium-hard

Duration: 45 minutes

Materials:

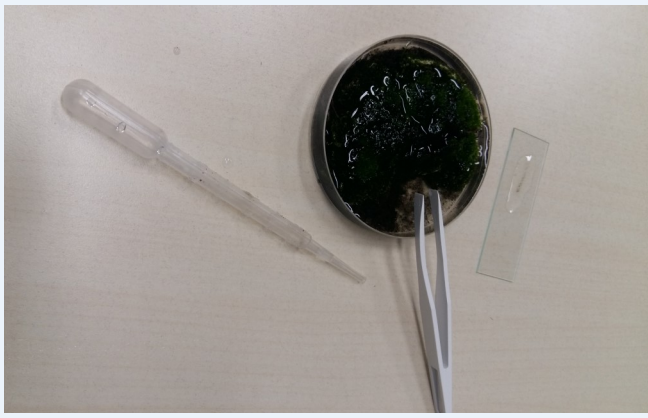
- **Fresh moss**
- **Petri dish or a small dish**
- **Tweezers**
- **Pipette**
- **Blips Labkit**

Observed subjects:

- **Tardigrades, rotifers, plant cells, nematodes, ciliated protists**

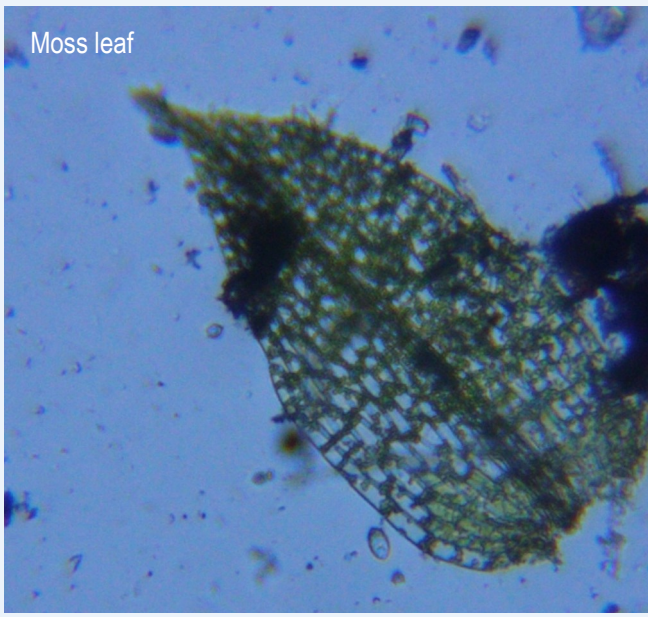
Procedure:

Collect the roots of moss and also some soil. To keep the moss moist, you should add a little water: one millimeter of water in the Petri dish is more than enough. If part of the water is left to evaporate in the disc, the microorganisms inside it will end up concentrating all in a restricted space, thus becoming easier to observe. Keep everything warm, at temperatures of 25-30° the microorganisms proliferate, at higher temperatures they die. In general it is enough to keep the moss moist, indoors and sheltered and it should keep providing subjects to be observed for days.



For the observations, remember to collect also a little soil or bits of moss in the pipette: many microorganisms feed on its leaves.

Put your sample on a plain slide, together with a drop of water. To keep the sample thin, you can add a cover slip.

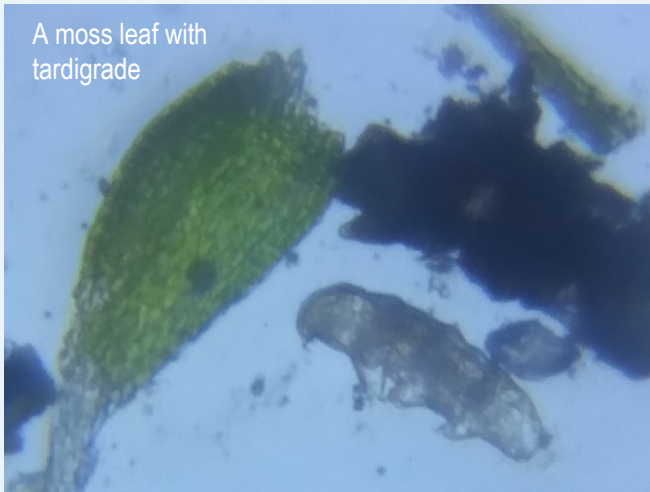


Moss leaf

Description:

Moss, one of the most common subjects of microscope observations, must be taken when it has a bright green color and it must never dry out. Ideally, you should collect and put it in a Petri dish when it is still wet .

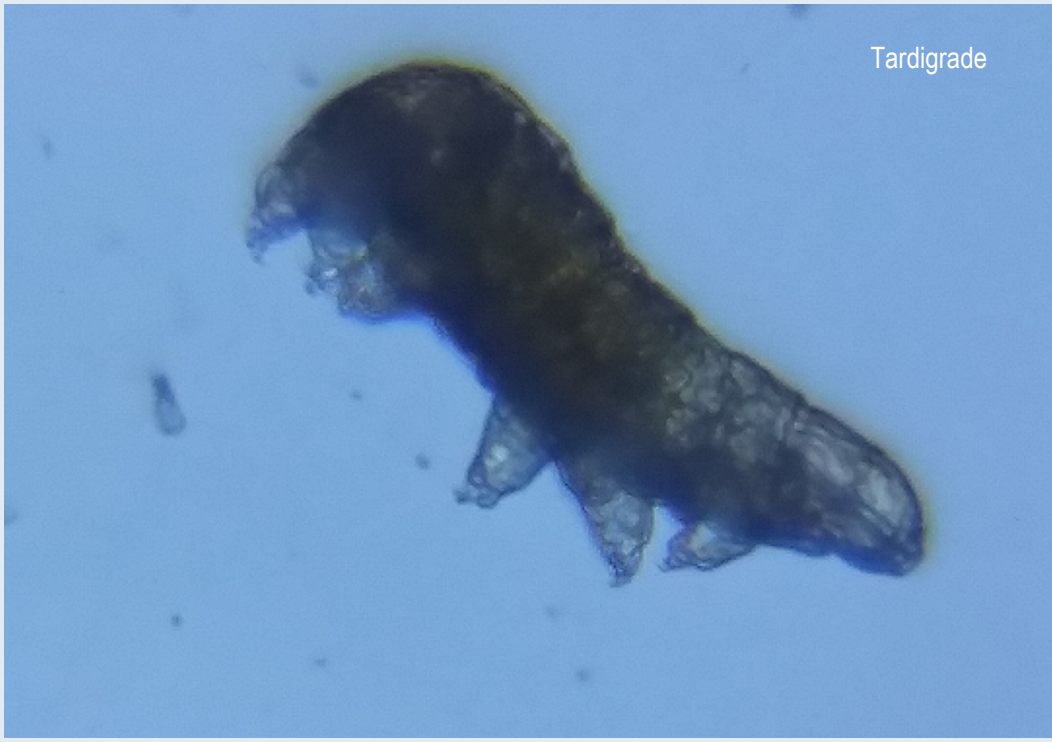
Even the single leaves of moss, in certain points, are thin enough to allow the observation of their individual cells. In the soil on the roots of moss, as mentioned, there are nematodes: they are microscopic, thin, transparent worms, which stir frantically when they are removed from the soil. There are thousands of species, but those collected this way are probably parasites of the moss roots.



A moss leaf with tardigrade

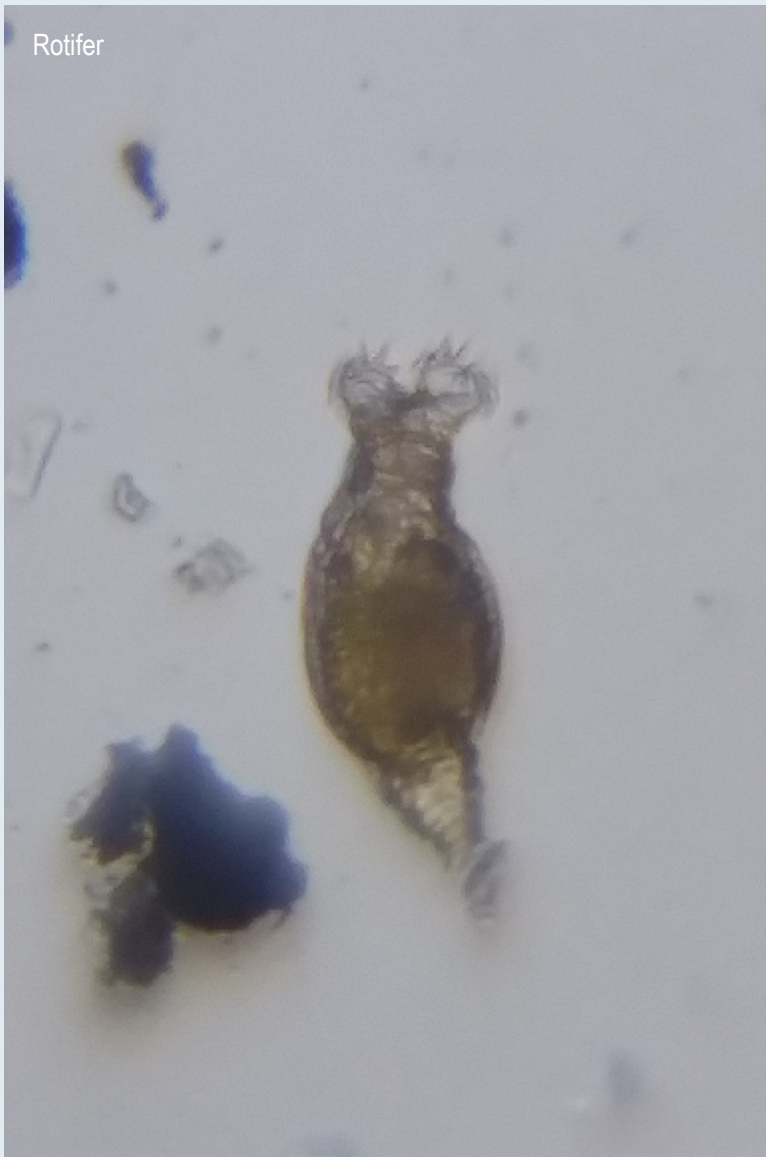
Another interesting subject that can be observed in the veil of water that covers moss are rotifers. These animals move in a way similar to leeches, crawling and using two kinds of suckers (one in the head and one in the foot) while when they stop to feed, they extract two coronas from their head that create a water current which delivers food in suspension to their mouth. They are a good indicator to understand if the collected moss is fine or not: if they are not found, probably nothing else will.

Tardigrades, animals now known also by the general public for their plump appearance, for their extraordinary resistance and for having survived in open space, are the “most wanted” subject of the microscopic observations of moss. However, they are not very easy to find. You have to be patient, but when you meet one, you can’t go wrong: they are significantly larger than the other organisms found on moss, and have an unmistakable appearance, with their stocky body and their eight legs. They are particularly clumsy on the microscope slide, so don’t be afraid: if you find one, it is very difficult for it to disappear from your field of vision.


Tardigrade

Many other microorganisms can be found in moss, but for the level of magnification provided by Blips Labkits (around a maximum of about 130x, based on the digital zoom of the used device), identification is really difficult. In any case, the vast majority of the round or slightly elongated corpuscles that swim with great speed in the water of the slide is made of ciliated protists, who quickly swim in the water using their ciliated structures.


Nematode


Rotifer

BACKWATER

Difficulty: medium

Duration: few minutes

Materials:

- **Backwater or infused hay**
- **Petri dish or a small dish**
- **Blips Labkit**

Observed subjects:

- **Algae, protists, crustaceans, insect larvae**

Procedure:

Collect some stagnating, turbid water with yellowish -brown color. A good alternative is an infusion of hay: to create it, collect some grass and put it in a jar with some clean water. Put the jar without lid in a warm place, not directly exposed to sunlight. After 2 -3 days the infusion is ready.

The sample must be collected with a pipette and put on a plain slide, covered with a cover slip to keep it thin.

Description:

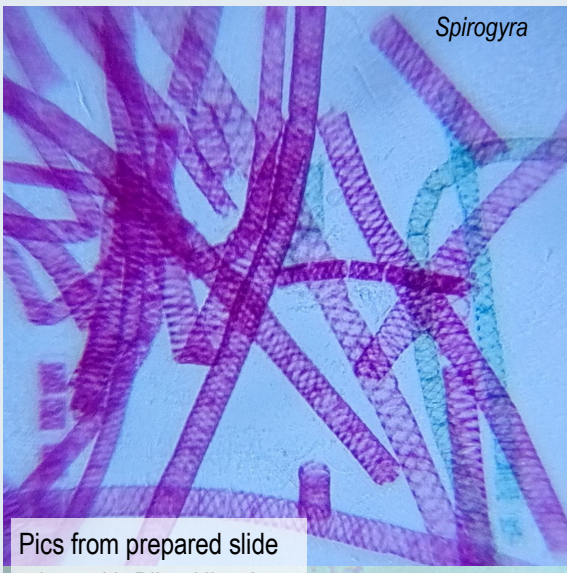
The infusion of hay, the water from saucers and any type of stagnant water for a few days and with organic residues can provide material suitable for microscopic observation. In general, a slightly yellowish or even turbid color can be the indicator for the presence of microorganisms. In any case, a saucer water, not too recent and not crystalline, usually contains interesting subjects to be observed under a microscope.

In this case, the observations that can be made are several and include algae of various kinds, many ciliates and small animals such as crustaceans or insect larvae. There are large quantities of ciliated protists, of various shapes and sizes, which swim quickly in the water.

Particularly elegant is *Vorticella*, a type of ciliate that instead remains anchored to the substrate by means of a peduncle, a few microns wide and about one hundred microns long. It is a filtering organism: from the movement of the cilia on the body, as for the rotifers, a stream of water is created, and it brings nutrients to their mouth.

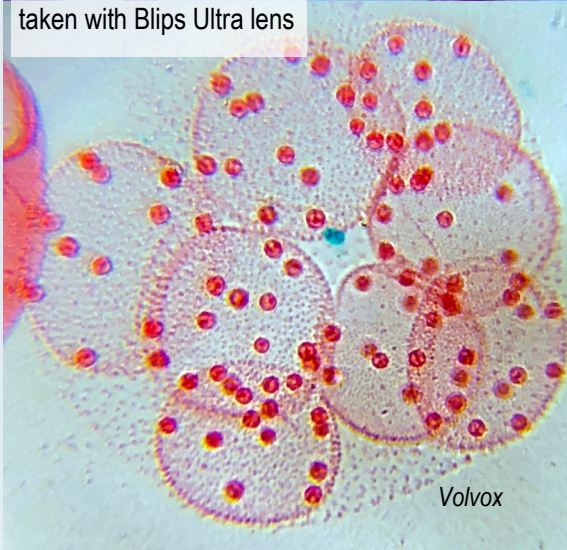
There is no shortage of amoebae, easily recognizable for their iridescent and irregular shape, and the colonies of *Volvox*, single-celled algae which, by grouping, create elegant spherical structures (it is often possible to observe other small structures inside them, the “daughter” colonies).

Particularly beautiful is *Spirogyra*, a type of filamentous alga. Inside of it, you can recognize the chloroplasts necessary for photosynthesis, arranged in a typical spiral structure.



Spirogyra

Pics from prepared slide taken with Blips Ultra lens



Volvox

FRESH WATER

Difficulty: medium

Duration: few minutes

Materials:

- **Fresh water from streams or lakes**
- **Petri dish or a small dish**
- **Blips Labkit or Macro kit**

Observed subjects:

- **Crustaceans, insect larvae, micro-organisms**

Procedure:

Collect some fresh water and put a drop of the sample on a plain slide. Add a cover slip to keep the sample thin.

Description:

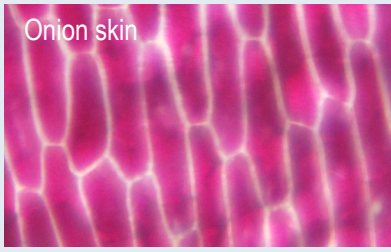
The water of lakes, rivers or simple pools offers a great variety of microorganisms suitable for observation under a microscope. Obviously it is more difficult to recover it in cities, but even the simple trickle that drains into the manhole offers a fair level of biodiversity, if its water is not polluted or altered in any way.

In general, the same rules apply to stagnant water: it is better if it is not excessively moving, it is better taking samples from those places where there is little current. Slightly cloudy waters, or waters containing organic residues are usually the suitable solution for finding microorganisms. In this case, insect larvae dominate it (especially in rivers).

They, moreover, are often observable with the naked eye, but there are many other subjects to be observed.

The important thing is that the water is not polluted or excessively altered. The easiest insect larvae to recognize are those of mosquito, easily identifiable by their elongated shape, similar to a caterpillar. There is no shortage of various swimming life forms, such as the copepod crustaceans of the genus *Cyclops*.

Cyclops on Blips Labkit



ONION SKIN

Difficulty: medium

Duration: 15 minutes

Materials:

- **1 onion**
- **Tweezers**
- **Methylene blue (optional)**
- **Blips Labkit**

Observed subjects:

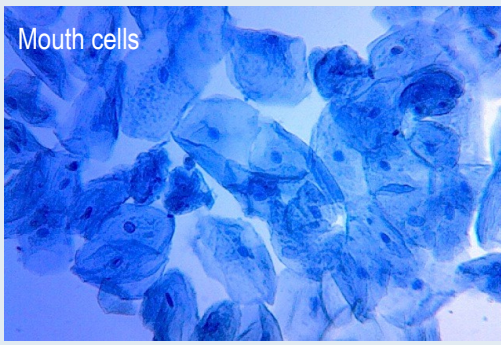
- **Onion plant cells**

Procedure:

Take a thin sample from an internal layer of the onion using tweezers, where two layers divide. The skin should be placed on the glass slide, over the light-source. A sample of a few millimeters per side is more than enough. The preparation is easier with little water to allow the cover slip to adhere to the slide, but it can be done also without coverslip.

Description:

This is a very simple experience that allows you to observe the regular structure of plant cells very clearly. The onion skin is so thin that can be hardly seen with the naked eye. If the sample has been made correctly and it is thin enough, the ordered structure of the onion cells will be clearly viewable. A simple variant involves coloring the sample with methylene blue, which colors the cell membranes and makes the cell nuclei perfectly distinguishable, which will appear as tiny spherical structures inside the cells.



MOUTH CELLS

Difficulty: easy

Duration: 15 minutes

Materials:

- **Cotton swab**
- **Methylene blue (optional)**
- **Blips Labkit**

Observed subjects:

- **Human mouth cells**

Procedure:

Use a sterile swab to scrape the inside of your cheek for a few seconds. Rub the swab onto a plain slide. Add a small drop of water/saliva to the sample and optionally color it with blue methylene. Cover the sample with a cover slip. The sample is ready to be observed . If you use methylene blue wait for few minutes, necessary to allow the cells to color.

Description:

With this experience you can observe your cells, directly taken from your body, directly on a microscope.

Some cells of the mouth mucosa, after swabbing, detach from the inner wall of the mouth and can be put on the slide. Methylene blue colors both cell membranes and cell nuclei and increases the contrast.

The cells will appear as irregular structures, generally rounded, slightly bluish, with a single dark blue dot inside them, which is the cell nucleus.

POTATO STARCH GRAINS

Difficulty: easy

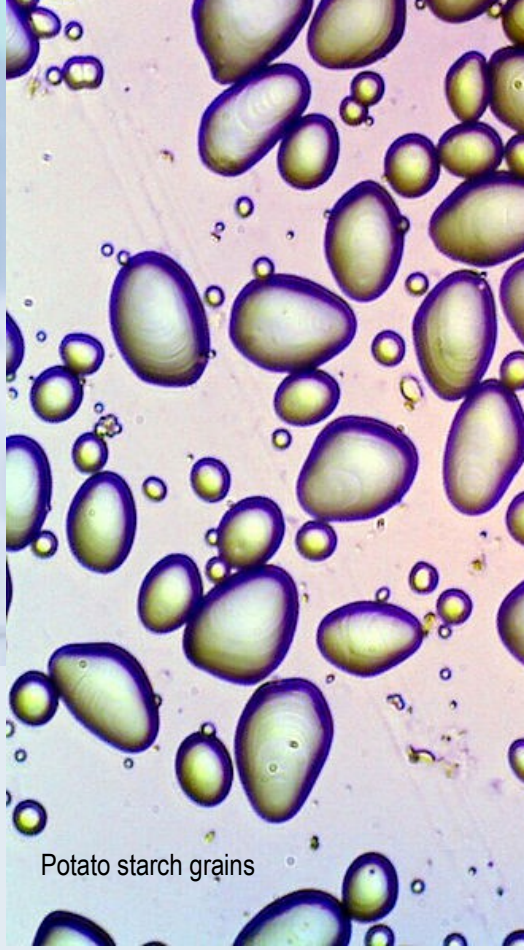
Duration: few minutes

Materials:

- **1 potato**
- **knife**
- **Iodine stain (optional)**
- **Blips Labkit**

Observed subjects:

- **Potato starch**



Potato starch grains

Procedure:

Scratch the pulp of a potato and place the obtained granules on a plain slide, together with a droplet of water. For a better result, color the sample with iodine stain. The dye is very powerful, and must be diluted 1:15 in water. Once in contact with the sample, the starch will immediately acquire a blue-violet color, and the individual granules will be observable under a microscope.

Description:

Starch is a typical reserve substance of plants, made up of glucose and water. It is solid and insoluble. In order to distinguish well their internal structure (they are formed by concentric structures around an aggregation center), it is necessary to use iodine staining. If distributed well on the slide, the individual granules will also reveal their internal concentric structures.

BASIL SEEDS

Difficulty: easy

Duration: few minutes

Materials:

- **Basil seeds**
- **Water**
- **Blips Labkit or Macro Kit**

Observed subjects:

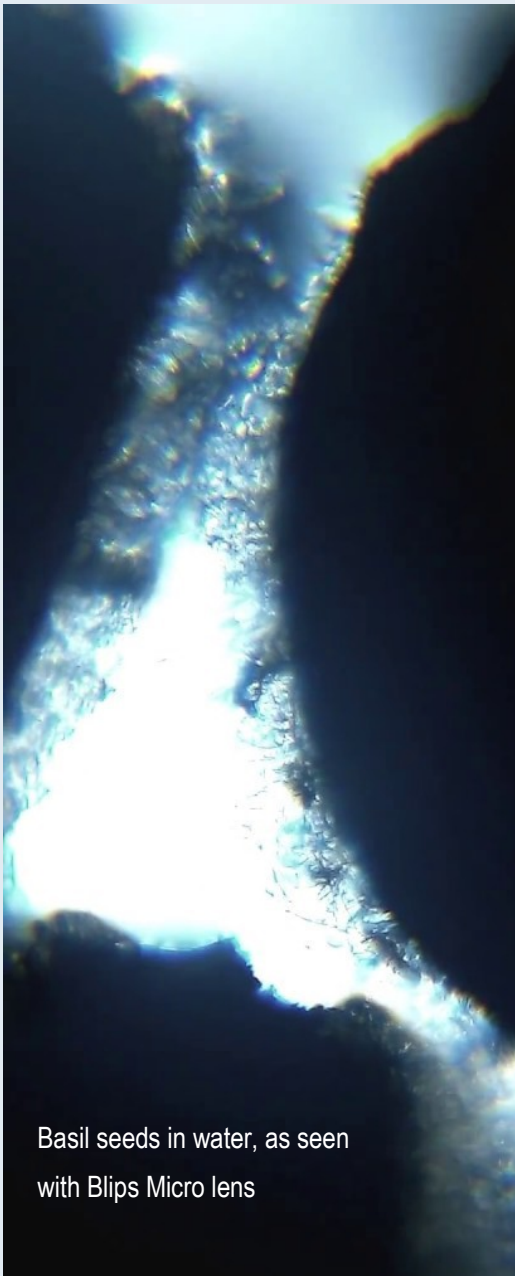
- **Gel formation on the seed surface**

Procedure:

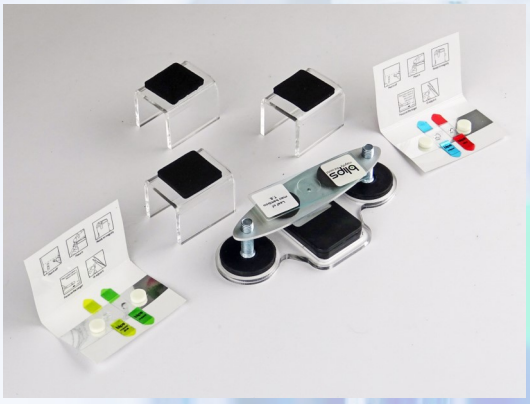
Put few basil seeds on a plain slide and wet them with a single drop of water. Do not use a cover slip.

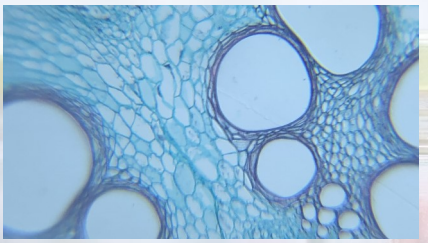
Description:

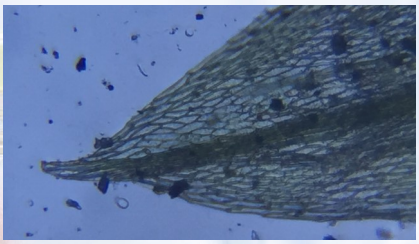
Basil seeds are “activated” by water. The surface of the seed, once wet, creates in a few seconds a sheath of mucilaginous substance similar to gel, of whitish color. To observe this surprising phenomenon, it is necessary to observe seeds very closely, since they are very small. The hydrophobic surface of the seeds can be observed with macro lenses or, alternatively, using the labkits in transmitted light. The seeds, in this case, are too thick to be observed, but the growth of the gel around their opaque shape can be seen in detail. No special procedures are required, except to wet the seeds gently and with little water.

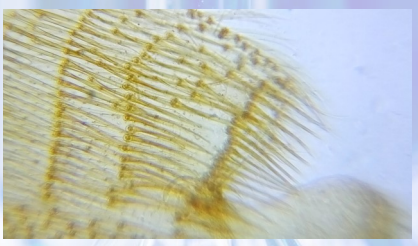


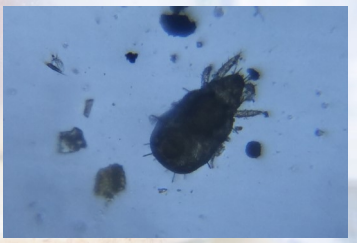
Basil seeds in water, as seen with Blips Micro lens

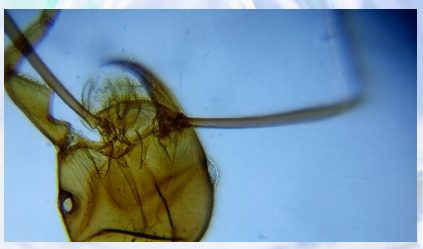












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