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Discovering the forest by head, heart and hands



This book is intended to encourage activities around the theme "forest" with students, so that they can discover the forest with their heads, hearts and hands.

www.discoveringforest.com

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Content:

Who ate the nut?	3
Portfolio	4
Guided tour with forester	5
Forest Kindergarten	6
Forest quiz and food web	7
Plant memory	8
Life in and on the ground	9
Guessing the right tree	10
Trust your mate	11
High vision	12
Back to balance	13
LandART	14
How old is a tree	15
Eco-detective	16
Christmas cards with natural material	17
Past-now-future	18
Sounds of the forest	19
Dead tree age calculation	20
Autumn habitat	21
Flora observation	22
National protected forests	23
Plant identification app	24
Decayed leaves	25
The earthworm	26
Animals in the soil	27
Chromatography	28
Water and soil	30

Who ate the nut?

Organisation: Mittelschule Lenggries

Type of activity: Observe and investigate on site.

Duration of activity: 20 minutes

Location: forest

Material: Hazelnuts (on site), information sheet with pictures to recognize bite marks, picture of dormouse, Eurasian jay, yellow-necked mouse and hazelnut weevil.

Content: Hazel shrubs are found in nature on forest edges regularly. The hazelnuts are used as food for animals such as mice, birds or insects. For opening the nuts, the animals have different techniques. On the basis of the food traces you can recognize, which animal ate the nut.



Dormouse



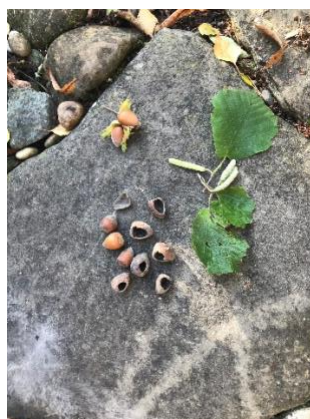
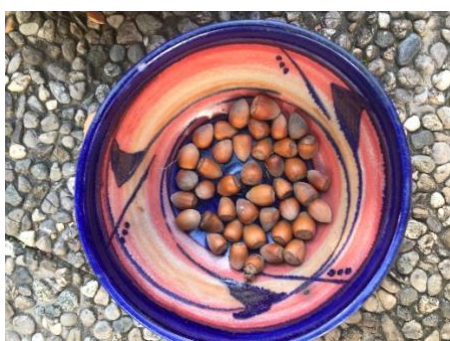
Eurasian jay



Yellow-necked mouse



Hazelnut weevil



Portfolio

Organisation: Mittelschule Lenggries

Type of activity: Independent development of a portfolio with information on the forest's ecosystem.

Duration of activity: 1 week

Location: forest, classroom, home

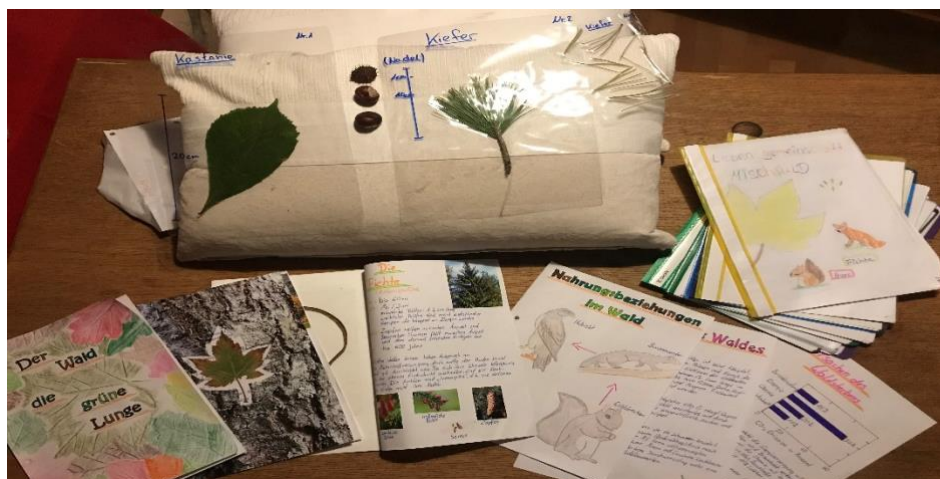
Material: school book, specialized literature, magazines, internet, camera, illustrative material, ...

Content: The students independently create a portfolio on the forest's ecosystem. Information can be obtained from their school books, specialized books and the internet. They gather information, pictures, representations and diagrams on the topic.

The content includes tree and shrub passages, food relationships in the forest, the significance of the forest for humans and nature, and the explanation of the dangers to the forest. The students design a cover sheet and an outline.

Possible tasks:

- Choose a deciduous tree and a conifer. Create an overview for each tree, with a matching picture and the description of the tree (height, flower, fruits, age)
- Create a clear food web of the forest, with the hawk at the bottom of the food chain
- Explain three functions of the forest
- Inform yourself about forest damage and the threat to the forest and search the Internet for a suitable diagram for causes of forest dying.



Development of knowledge on the topic "forest"

Organisation: Mittelschule Lenggries

Type of activity: Guided tour through the forest with a forester

Duration of activity: 2 hours

Location: forest

Content: The teachers were given the opportunity to learn a lot about the forest through a guided tour of a forester and to expand knowledge. The tour had the following contents:

- The impact of the climate change on the forest
 - o Drought and heat
 - o Spruce tree as a loser of climate change and beech as a tree of the future
- Parasites and diseases in the forest
 - o Bark beetle
 - o Fungal infections
- Protective measures against browsing by games
- Modern computer programs for forest management in the future



Educational Concept "Forest Kindergarten"

Organisation: Mittelschule Lenggries

Type of activity: Visiting a forest kindergarten and getting to know the educational concept.

Duration of activity: 90 minutes

Location: forest

Content: The concept "forest kindergarten" has been very successful for several years. The initiator of the "Waldkindergarten Gaißbach" introduced the concept to the teachers and led them through the kindergarten and the places in the forest, which are visited by the children and their educators.

The concept behind is based on the knowledge that children can move, play and learn better in nature and in addition develop an awareness of ecological relationships at an early age. The fact that mainly natural materials are available for play leads to creativity and imagination. The forest kindergarten just has a small trailer to store material. As a rule, educators always stay outdoors.



Forest quiz and food web

Organisation: Mittelschule Lenggries

Type of activity: quiz/game

Duration of activity: 45 minutes

Location: forest

Material: several small cards, each with a picture and short information about a species of the forest (e.g. bear, fox, pine, fly agaric mushroom, ants, etc.), clip to tag cards on clothes, long rope

Content: The trainer showed the teachers several possibilities of how to discover the forest in an experiential way with students. One of the activities was the "forest quiz".

Every student gets a picture card of a species of the forest tagged on its back. The student shouldn't know which species. By asking questions about the species which can only be answered with 'yes' or 'no' the student has to find out which species is on the back. When all students found out their species all come together in a circle, holding their cards in hands. By looking around students have to find out how the different species in the circle have a relation. The students verbalize the relation and connect each other with a rope.

E.g.: Student A has the card "fox", student B has the card "mouse". Relation: Fox eats the mouse. Rope from A to B and so on.

At the end there should be a web showing the food relations in the forest. There is a good possibility of showing the influence of the loss of a species by telling several students to let go of their rope because their species have died. The web breaks down.

This game requires prior knowledge about the ecosystem of the forest.



Plant-Memory

Organisation: Mittelschule Lenggries

Type of activity: quiz/game

Duration of activity: 30 minutes

Location: forest

Material: blanket (something to cover things), leaves, branches, waste, etc.

Content: The trainer showed the teachers several possibilities of how to discover the forest in an experiential way with students. One of the activities was the "plant-memory".

The teacher is collecting four different things in the forest. For example, two leaves of different trees, one fruit or nut of a tree and also, as a bad example, a piece of waste. The teacher puts these objects side by side on the ground and tells the students to watch and memorize them within one minute. After this minute the teacher covers the objects with a blanket and the students have to find the same objects in the forest. By using the waste, students should become aware of objects and materials which are not part of the ecosystem of the forest and might even harm it.

Talking about waste and its influence on ecosystems should be part of the activity.



Life on and in the ground

Organisation: Mittelschule Lenggries

Type of activity: observation

Duration of activity: 15 minutes

Location: forest

Material: old branches

Content: The trainer showed the teachers several possibilities of how to discover the forest in an experiential way with students. One of the activities was showing the life on and in the ground.

The teacher takes two longer branches and places them parallel to each other. The teacher is creating different sections by placing branches at intervals across the two longer branches. Now there are different sections on the ground. In each section the teacher removes one layer of the soil (leaves → decomposed leaves → humus). The different soil layers are now being examined for material, consistency and living beings.



Guessing the right tree

Organisation: Mittelschule Lenggries

Type of activity: game

Duration of activity: 20 minutes

Location: forest

Material: blindfold

Content: The trainer showed the teachers several possibilities of how to discover the forest in an experiential way with students. One of the activities was a game to find a tree after feeling it blind.

This is a game for two partners. One of the partners gets a blindfold and the other one is helping to move the blind through the forest with good care. The leader will choose a tree for the blind partner. Without seeing, the blind partner is touching and feeling the tree. Afterwards the seer leads the blind back to the starting point. Now the blindfold may be removed and it can be guessed which of the trees was felt.



Trust your mate

Organisation: PLOYTARCHEIO - 4th GYMNASIUM OF LIVADEIA

Type of activity: Trusting building activity and senses stimulation

Duration of activity: 15 minutes

Location: forest

Material: pieces of clothes to cover eyes

Content: Students cover their eyes, line up and hold on the shoulder of the person in front of them. The leader starts to walk and everyone follows. This exercise stimulates all senses, apart from sight, and makes students trust the person in front of them. It makes them focus on sounds, smells and ground surface that excite their imagination to build the space around them. After the end of the exercise a discussion is made about the feelings of not being able to see and having to trust another person for safety.



High vision

Organisation: PLOYTARCHEIO - 4th GYMNASIUM OF LIVADEIA

Type of activity: Different perspective of the forest

Duration of activity: 15 minutes

Location: forest

Material: mirrors

Content: Mirrors are handed out to each student and hold them face up horizontally in front of their mouth preventing their vision to look down. Students line up using the other hand to hold the shoulder of the person in front of them and start to walk in the woods. Their vision is now focused on the upper view of the forest that is rare to view since people walk by looking down as it makes them feel safe. The point of view of the forest is like having eyes of the top of our head. The objective is to realize that different perspectives give other visions of life as it is often used in problem solving situations.



Back to balance (from simple to complex and again to simple)

Organisation: PLOYTARCHEIO - 4th GYMNASIUM OF LIVADEIA

Type of activity: Energizer psychomotor game

Duration of activity: 45 minutes

Location: open space at the forest

Material: ---

Content: Students form a circle by holding hands with each other. They secretly choose a student that is not holding hands with them and they start walking when the instructor asks them to. After a few minutes they stop and hold their hands with the same students as it was at the initial circle. Now they try to rebuild the initial circle without letting their hands with the use of any movement.

This activity aims to show the relationships between organisms in nature that are interconnected in a balanced state but they can be disrupted for some reason. With proper maneuvering and management, they can return to their original state.



LandART

Organisation: PLOYTARCHEIO - 4th GYMNASIUM OF LIVADEIA

Type of activity: Creative art.

Duration of activity: 45 minutes

Location: open space in the forest

Material: materials found in nature

Content: The objective is to enhance students' observation ability, to realize that nothing is useless in nature and to stimulate their imagination, creativity and manifest their artistic skills.

Students form groups and collect from the surrounding area dried leaves, twigs, fruit, stones and create a work of art. Each group present its work and discuss the idea behind it.



How old is a tree?

Organisation: PLOYTARCHEIO - 4th GYMNASIUM OF LIVADEIA

Type of activity: Experiential learning on calculating the age of a tree.

Duration of activity: 30 minutes

Location: forest/park/garden

Material: pen, paper.

Content: Students try to estimate the age of young/small and large conifer trees. On young trees they count the spaces between branches and this number is the age of the tree. On large trees they have to find the perimeter of their log and calculate the age by using the formula $[\text{perimeter}(\text{cm})/2,5]$. Given that the human arm span measurement is usually very close to the person's height, students wrap around the tree as stretched as possible. Students sum up their heights and the result is approximately the perimeter of the tree. By using the formula, they come up with the approximate age of the tree. They can understand the long living of a forest and in case of fire or disaster how many years will take to be restored.



Eco-detective

Organisation: PLOYTARCHEIO - 4th GYMNASIUM OF LIVADEIA

Type of activity: Experiential learning by role-playing.

Duration of activity: 90 minutes

Location: forest

Material: Pen & paper

Content: Students are divided in groups and take the role of the eco-detective. Their mission is to look carefully around the area and investigate on the findings.

What eco-detectives look for?

- Something alive.
- Something that once was alive.
- Something that changed the last 2 years.
- Something that can't be measured.
- Something that can't be photographed.
- Something that is not an inextricable part of the ecosystem.
- Something that can be used as a tool.
- Something that can be food for plants and animals.
- Something that will not be here after 100 years.



Two groups of 9 persons each. Each team assigns to each of its members to find one of the above. The head of the team notes down the findings and discusses with the rest of the group why they chose the specific data. Then the 2 teams sit at a round table and discuss the two lists. They compare and contrast them.

What have the participants learned and done? Discovery learning, what is there and why,

With this activity all senses are stimulated and students feel the forest with their heart, hand and head.

Christmas Cards with natural material

Organisation: PLOYTARCHEIO - 4th GYMNASIUM OF LIVADEIA

Type of activity: Creative art

Duration of activity: 90 minutes

Location: classroom

Material: Paints and natural materials from the forest

Content: During their visits to the forest, students collected natural materials from the ground and brought them back to school. During art class they created Christmas cards using and sharing them with their project mates.

This activity improves creative spirit and makes use of Christmas time to share artistic items between students. Natural material found on the ground of the forest are used for the cards and students understand that nothing is useless in nature.



Past-Now-Future

Organisation: PLOYTARCHEIO - 4th GYMNASIUM OF LIVADEIA

Type of activity: Research on forest development

Duration of activity: 90 minutes

Location: classroom

Material: Pen & paper

Content: Students are divided into three groups: Past (What was in the area), Present (What's now) and Future (What will be). The "past" group discusses how the forest was in the past. The "present" group lists the reasons of changes that led to present and identify them. The "future" deals with what is going to happen in the forest in case of fire, if temperature rises, what if the forest gets overused by humans and how it should be managed to avoid these issues.



Listening to the sounds of forest

Organisation: PLOYTARCHEIO - 4th GYMNASIUM OF LIVADEIA

Type of activity: Emotional identification and focusing on sound

Duration of activity: 20 minutes

Location: forest

Material: Pen & paper

Content: Participants are divided into small groups and close their eyes for 2 minutes and try to focus on the sounds of forest. What comes to their imagination by listening to the sounds? Identify their emotions about these sounds and explain the reason they felt like this. What are the associations between sounds and emotions?



Dead tree age calculation

Organisation: PLOYTARCHEIO - 4th GYMNASIUM OF LIVADEIA

Type of activity: Calculating a cut off tree age

Duration of activity: 30 minutes

Location: forest

Material: ---

Content: Students learn by counting the log rings to calculate the age of a cut tree. From the thickness of the log rings, conclusions can be drawn on the climatic conditions in the region over the past few years. e.g. a thick ring means that this particular year there were favorable conditions with plenty of rainfall and plenty of nutrients consumed by the tree.



Autumn habitat

Organisation: PLOYTARCHEIO - 4th GYMNASIUM OF LIVADEIA

Type of activity: Observation activity

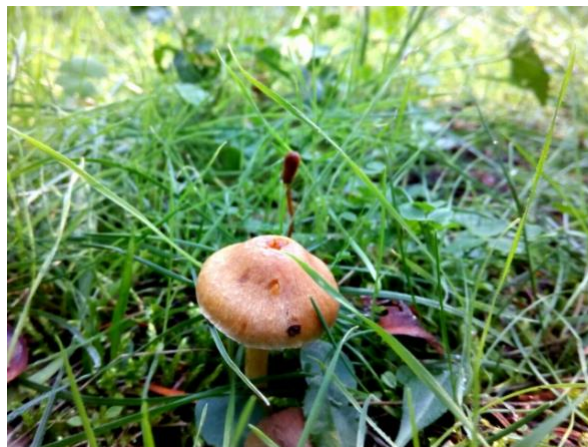
Duration of activity: 120 minutes

Location: forest

Material: camera

Content: Students observe trees carefully and discover symbiotic and parasitic organisms, discover their differences and their role in the ecosystem. They identify moss, lichens, *viscum album*, ivy.

During autumn season, they observe species of mushrooms and understand the concept of degradation and the use in nature.



Flora observation

Organisation: PLOYTARCHEIO - 4th GYMNASIUM OF LIVADEIA

Type of activity: Observation and discovery learning

Duration of activity: 120 minutes

Location: forest

Material: rope tight wedges 1mx1m, pen and paper

Content: Students learn to distinguish the differences and density in vegetation, foster the ability to compare and discriminate elements of each vegetation type and what kind of conclusions can derive from the observation. Students work in groups and each group places in different locations the 1x1m frame on the ground and record the findings as a number and variety of plants and investigates for conditions that affected such as humidity, temperature, sun exposure, wind etc.



National protected forests-Natura2000

Organisation: PLOYTARCHEIO - 4th GYMNASIUM OF LIVADEIA

Type of activity: Study on National protected forests

Duration of activity: 30 minutes

Location: classroom

Material: map, questionnaire

Content: Students research on the term "National protected forests" and understand the reasons why an area is under protection. They also find out how the area is protected and by whom. Finally, they realize the importance of existence of the "protection forest agency" and the role of it.

Students divide into two big groups and each group writes 5-6 questions about the term of "National Protected forest". They exchange questions and they have to seek answers and explain to the opposite group.



Plant Identification App

Organisation: PLOYTARCHEIO - 4th GYMNASIUM OF LIVADEIA

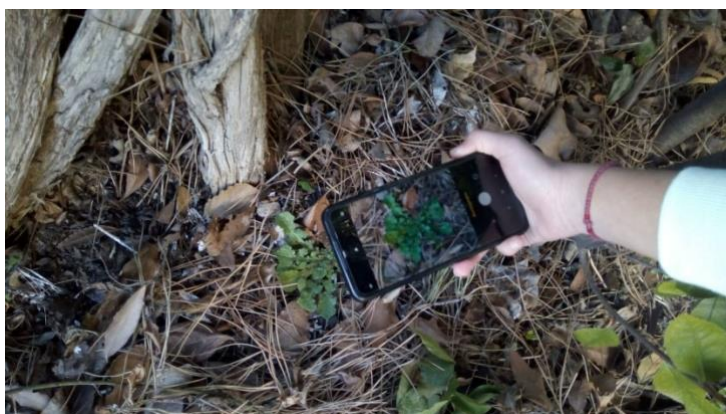
Type of activity: Technology based activity on traditional subject

Duration of activity: 45 minutes

Location: forest

Material: Smartphone(or tablet), Pen & paper

Content: Participants are divided into groups of 3-4. They select a specific path in the forest and identify the variety of plants by using a plant identification App. During the walk they picture all different plants and write down their scientific names on the worksheet. When they finish their walk, they gather more information about each particular plant and create the plant map of the area. Upon return home they ask their grandparents to tell them if some plants are eatable and if they benefit our health.



Decayed leaves

Type of activity: Observation

Duration of activity: 25 minutes

Location: forest

Material: freshly collected leaves (decomposed to varying degrees); white plastic bowl or plate, tweezers, wooden stick, magnifying glass, paper

Content: Use the magnifying glass to examine the collected leaves from all sides. Use the tweezers and wooden stick to examine them more closely. What does the leaf surface look like? What animals can you find?



What is the earthworm doing in the soil?

Type of activity: Observation

Duration of activity: 1 week

Location: forest and classroom or home

Material: Screw-top jar (500ml) with a perforated lid, about 20 earthworms, potting soil, light sand, leaves, grass, dark cloth, spray bottle with water

Content: Fill the jar alternately with light sand and dark soil. Finally, add leaves and grass. Dampen the soil with water. Carefully place the earthworms on the top layer. Close the jar and cover it with the cloth. Put it in a dark, cool room. Check every other day for a week. Slightly moisten the surface.

Watch the earthworms burrow.



Animals in the upper soil layer

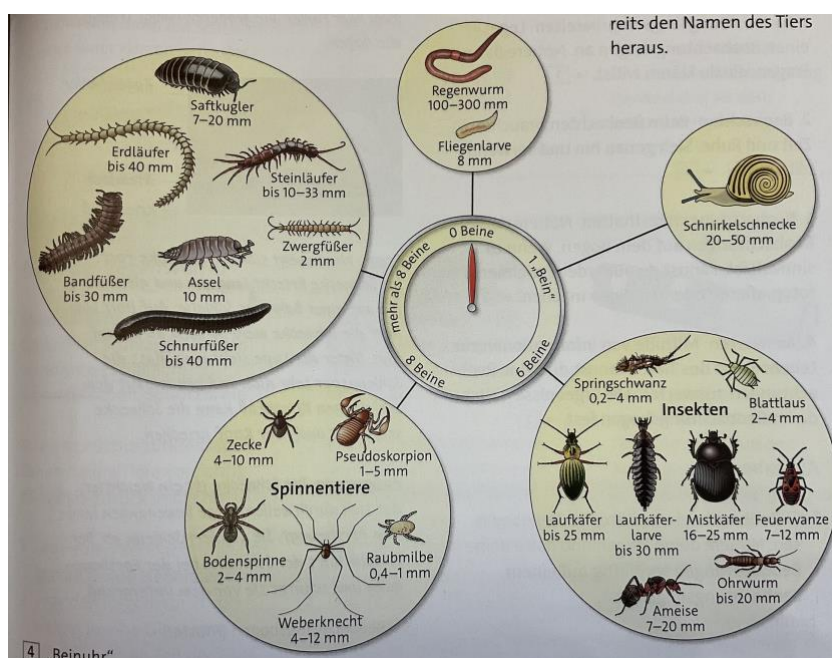
Type of activity: Observation and investigation

Duration of activity: 60 minutes

Location: forest

Material: Hand shovel, container with lid, white linen cloth, magnifying glass, drawing material, soil from the top layer of soil, "leg watch"

Content: Spread the cloth out on the floor. Spread a shovel of dirt on it so that the animals cannot hide. Examine the earth with the magnifying glass. Can you find animals in it? With the help of the "leg watch" you can arrange the animals in groups.



Separating Plant Pigment: Chromatography

Organisation: Vedruna Balaguer

Type of activity: Separation of pigments by paper chromatography

Duration of activity: 2 hours

Location: forest /laboratory...

Material: 2 fresh leaves. *Epipremnum aureum* and *Ficus benjamina*



Lab's material:

Beaker, 95% Ethanol, Glass bar, Staining plate and Chromatography paper

Content:

All living organisms require energy for their metabolic (chemical) processes. The ultimate source of this energy is the sun. Photosynthetic organisms, including plants, protists (single-celled organisms), and blue-green algae (cyanobacteria), convert light energy into the chemical energy of sugars, which can be used to power metabolism. During photosynthesis, molecules referred to as pigments (due to the wavelength, thus color, they reflect) are used to capture light energy. Four primary pigments of green plants can easily be separated and identified using a technique called paper chromatography. These pigments include two greenish pigments called chlorophylls and two yellowish pigments called carotenoids and Xanthophylls. Pigments are separated according to differences in their molecular weights.

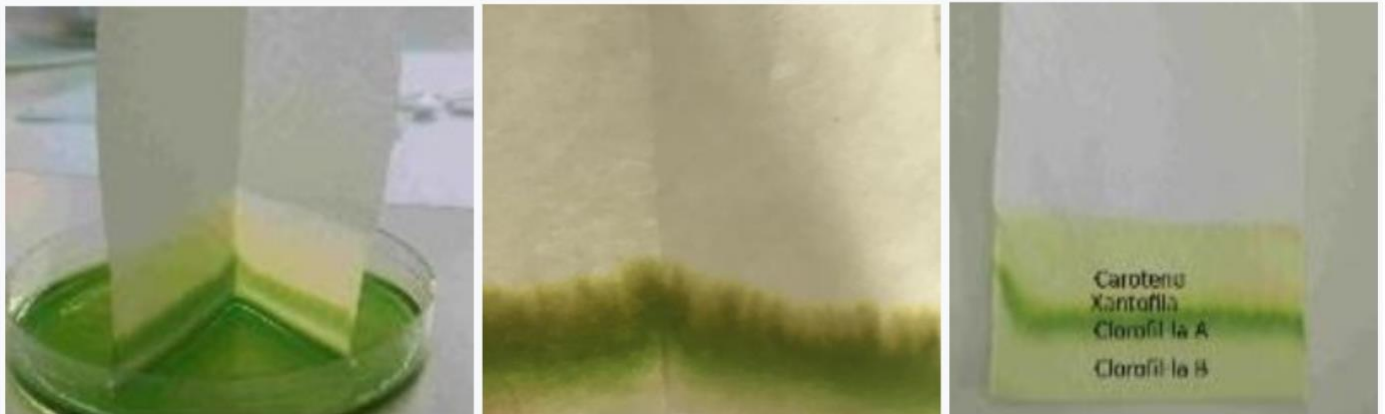
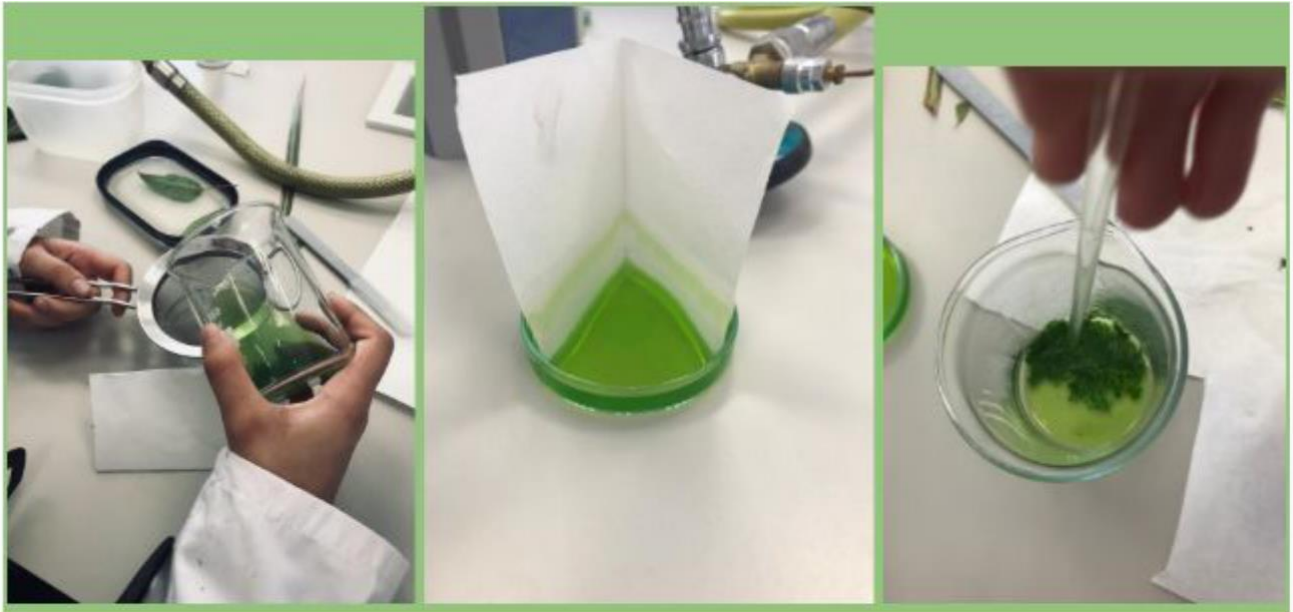
In order to extract these pigments from the thylakoid membranes of the chloroplasts, the organelles in which photosynthesis occurs, fresh, ground or torn leaves may be soaked in concentrated alcohol. The chloroplast pigment extract pictured at left was obtained by boiling fresh leaves in 95% ethanol for several minutes and then filtering using gravity filtration. Pigments are then "painted" onto strips of chromatography paper. The paper is allowed to remain in the solvent until the uppermost pigment band nears the top of the paper.

What was the content of the activity? What have the participants learned and done?

The result is spectacular. The different photosynthetic pigments of the leaves are marked on the paper in order of their weight. Thus, the chlorophylls remain at the bottom of the paper and the xanthophylls and carotenoids are located further away from the plate.

With this practice we can know the pigments responsible for photosynthesis as well as their weight and color. The coloring is related to the light absorption strip. Thus we see how the coloration of the pigments is related to the color of the absorbed band of light.

Process. Images



How much water does the soil hold?

Type of activity: Observation and investigation

Duration of activity: 45 minutes

Location: school lab

Material: 4 flower pots of the same size, 2 bricks, 2 strips of wood, 4 filter bags, 4 jam jars of the same size, thin wire, measuring cup, stopwatch, water, samples of sandy soil, humus soil (garden soil), loamy soil and clay soil

Content: Set up the experiment as shown in the picture.

- Put a piece of angled wire in the hole of each flower pot to help drain.
- Put the filter bags in the flower pots and fill them evenly with the soil samples.
- Starts the stopwatch. Slowly pour 100ml of water onto each sample.
- Measure the time it takes for water to stop dripping from the wire.
- Measure the amount of water that has passed through and also note it down

