Experiment description / Manual

Biology

Cornelsen
EXPERIMENTA

Biology

Science kit

Biology

Order no. 18080

This Science kit is recommended for students at the age of 8–11.

Contents

Biology

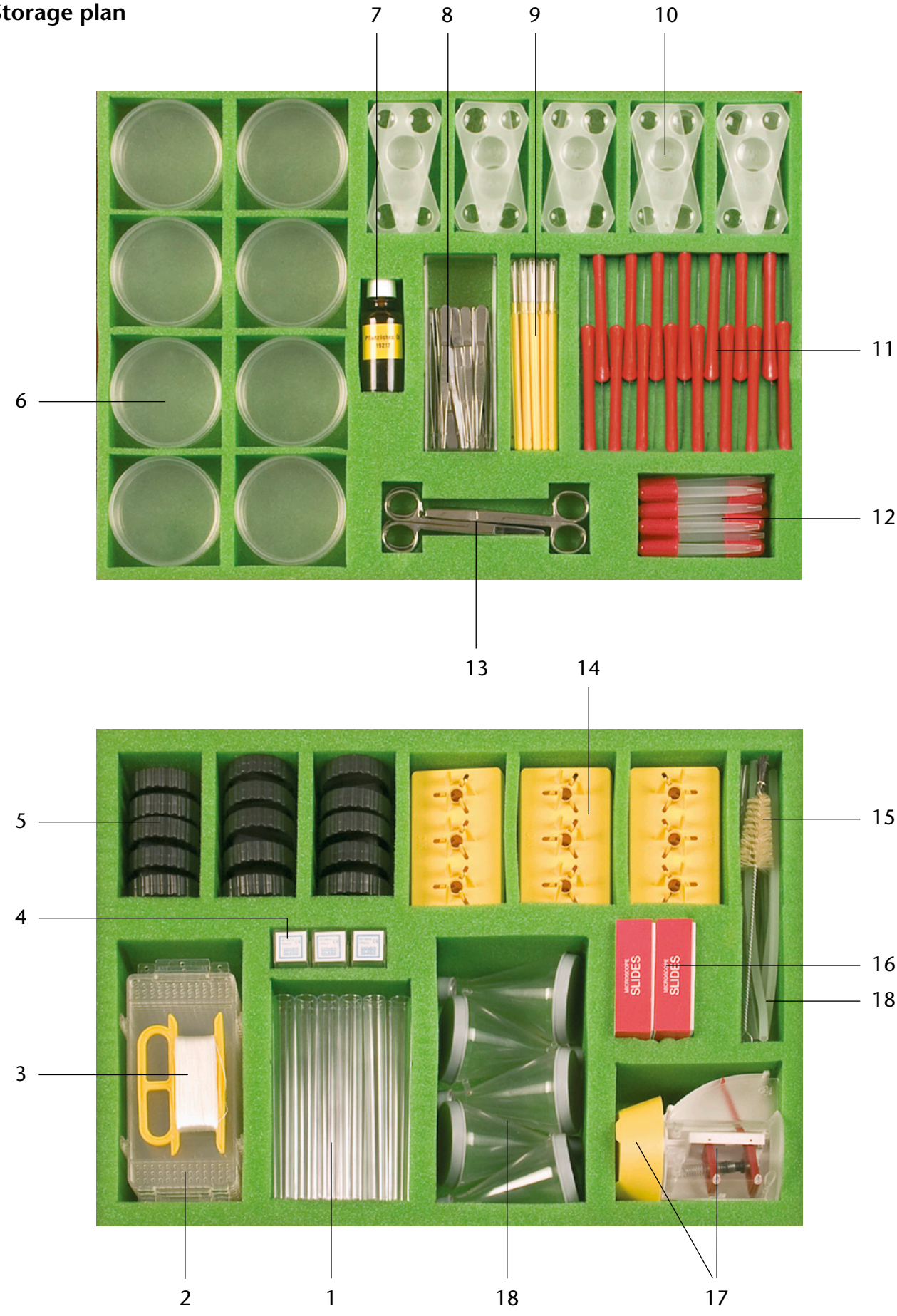
List of components

Illustr. no.	Qty.	Description	Order no.
1	30	Test tubes, plastic, 152 mm, 16 mm Ø	17680
2	10	Coasters/flower press components (a flower and leaf press is assembled from two coasters)	19225
3	1	Tread on spool	19039
4	300	Cover glasses	89235
5	15	Microtomes	89920
6	16	Sets of double dishes, plastic, 80 mm Ø	17710
7	1	Bottle of vegetable oil	19217
8	15	Pairs of tweezers, stainless steel, 105 mm (in plastic box no. *13189*)	17630
9	15	Dissecting needles, 140 mm	17621
10	25	Triple magnifiers, magnification 3x, 6x, 10x	17613
11	15	Knifes, stainless steel	17656
12	15	Droppers	12875
13	10	Pairs of scissors, stainless steel, 115 mm	17648
14	15	Stands for test tubes	17702
15	1	Test tube brush	17699
16	100	Microscopic slides	89260
17	1	Rapid scale, with removable pan (no. *18075*)	27100
18	5	Pooter	89296
–	1	Package of adhesive plasters	17672
–	2	Cloths	18105

Enclosed printed material

–	1	Experiment description/Manual ‘Biology’	180806
–	1	Storage plan ‘Biology’	180803

Storage plan



Biology

1 Learning aims

General activities

The students receive practice in:

- Independent learning
- Experimenting - observing – describing
- Using a microscope and preparing slides
- Collecting experiment results – comparing – concluding
- Social behaviour by partner work

The students are learning during the practical work:

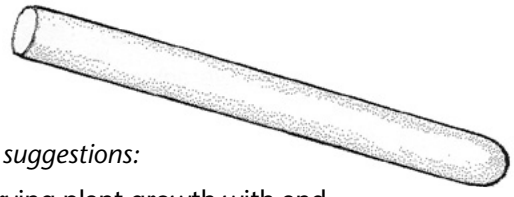
- Observing with the aid of a magnifying glass and a microscope.
- Dissecting and preparing plants and animals.

2 Equipment information and activity suggestions

2.1 Botanic experiments

2.1.1 Plastic test tubes

It may not be heated over fire. If necessary, it can be warmed up in a water bath.

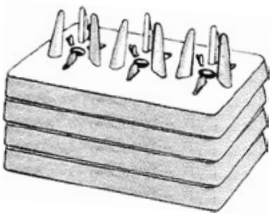


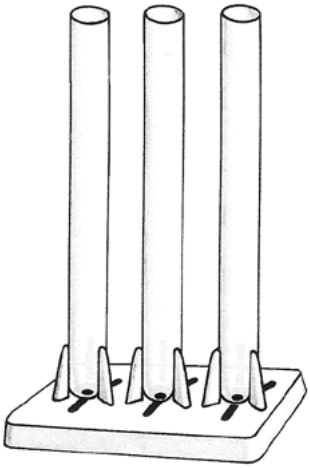
Activity suggestions:

- Observing plant growth with and without water, as well as with and without roots.
- Experiments on settling elements in soil samples.
- Cultivating cuttings and slips from plants.
- Experiments on plant nutrition (e.g. distilled water, nutritive liquids).
- Comparative observations of different plants kept in the classroom.
- Experiments on assimilation.
- Experiments on the function and activity of roots. (e.g. put one plant into water by its roots, and another by its leaves. Compare them after a few hours.)
- Experiments on plant transpiration (two plants of equal size are put into separate glasses of water; smear the undersides of the leaves of one plant with oil to close the pores. Cover the surface of the water in both glasses with a thin layer of oil to prevent evaporation.)

2.1.2. Stand for test tubes

The test tube holders can be pilled up in pairs when staggered at an angle of 180°. They may also be used for holding heated test tubes made of glass.

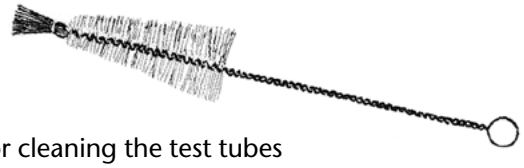




Activity suggestions:

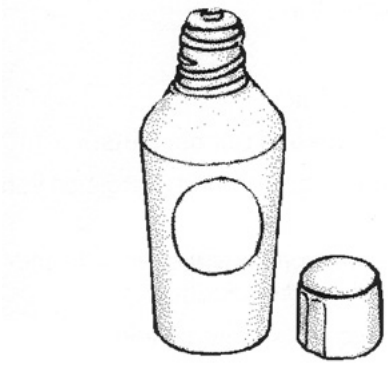
- Long-term and comparative experiments.

2.1.3 Brush for cleaning test tubes



- For cleaning the test tubes

2.1.4 Vegetable oil

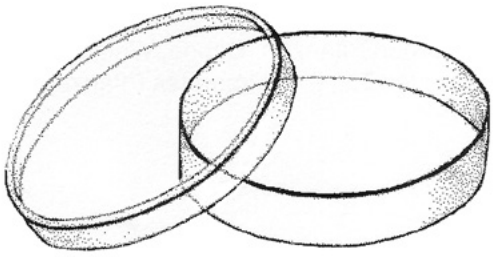


- For experiments on evaporation, liquid requirements, etc. of plants, the surface of the water in the test tube or in the multi-purpose container should always be protected against evaporation with a thin layer of oil. Thus misrepresentations of the results through the evaporation of the water's surface can be avoided. Use the pipette if the bottle has not got a drop-cap. A few drops of oil suffice. Close the bottle tightly after using it. Mark the pipette used with the oil and store it in the compartment of the oil.

2.1.5 Double-dish

Experiment demonstrating the force of seed swelling:

An adequate quantum of plaster is mixed with water and cast into the lower part of the double dish. Into the fresh layer of plaster some peas are inserted. After the setting process of the plaster, water is poured into the dish. After some time the result can be observed.



Other activity suggestions:

- Creating a humid chamber for germination experiments, insert moistened cotton, for use with seeds and cut stems of different plants.
- Observing mould growing on leaves.
- Experiments on the decomposition of leaves.
- Observing the ejection of spores from the cap of a mushroom.

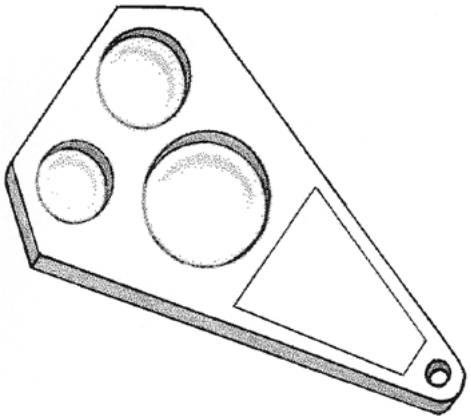
2.2 Collecting, observing, examine and determining

2.2.1 Triple magnifier

The magnifier can be taken along on excursions, by hanging it from a cord around the neck.

The big lens amplifies 3 x, the middle one 6 x, the small lens 10 x.

To prevent a fire by focussing sun light, take care that the lenses are not used in direct sun light.



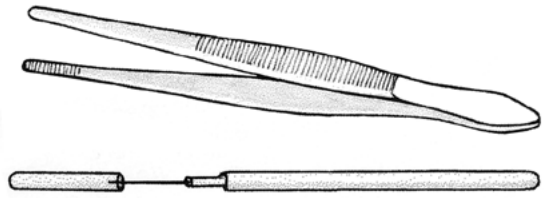
Activity suggestions:

- Observing seeds, buds, blossoms, fruits, bulbs, stalks, and bark in their entirety and in longitudinal and cross-sections.
- Determining the size of granules in soil samples.
- Observations of living and dead insects and other small animals (anatomy, posture, organs of locomotion like wings and legs, mouthparts, and organs for seeing and feeling).
- Detailed examinations of animals, e.g. a spider's poison fangs, or the eye of a maybug.
- Examining bird feathers.
- Inspecting badly cleaned teeth, dandruff particles, thumb prints, human skin and hair.

2.2.2 Dissecting needle and tweezers

To prevent injuries, the dissecting needle should always be covered after each use with the transparent cap.

Use tweezers principally for grasping or holding objects to be examined or observed, especially very tiny objects, instead of using your fingers or hands.

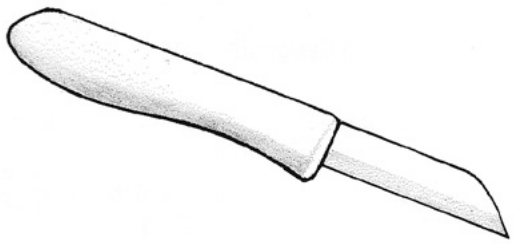


Activity suggestions:

- Opening and dissecting seeds, buds, and blossoms.
- Transplanting seedlings into the germination box or into the earth.
- Setting off processes of pollination and contact-stimuli.
- Analysing nests, pellets (casting) of birds, and insects.
- Dissecting fish and small mammals.
- Defining layers of eggshells, observing and puncturing eggs.
- Feeding small captive animals.

2.2.3 Knife

This knife differs from an ordinary potato-peeling knife in having a shorter blade in relation to the longer length of the handle, thus allowing even the smaller hands of children to be able to handle the knife safely. To protect the table's surface when using the knife, it is advisable to use one of the flower press components as work surface and base.

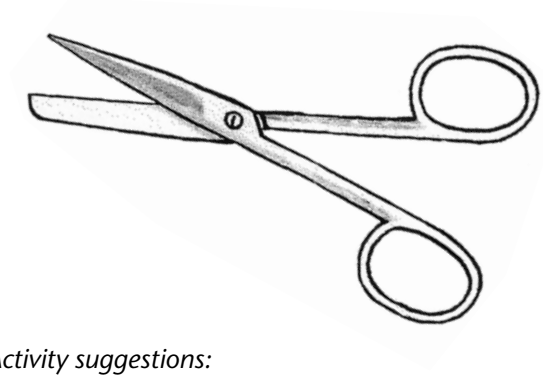


Activity suggestions:

- Cutting plants and twigs.
- Cutting longitudinal and cross-sections of parts of plants which grow above or beneath the soil, and mushrooms.
- Peeling fruits, bulbs, and seeds.
- Digting out plants from the soil.
- Dissecting.

2.2.4 Special scissors

Each of the scissors has a pointed and a blunt blade end. When cutting surfaces, the blunt end ought to be on the underside, so as to prevent damage to other underlying parts.



Activity suggestions:

- Cutting and dissecting stalks and other parts of plants.
- Cutting out leaf shapes (patterns) out of paper.
- Dissecting fish and small mammals.
- Examinations of eggs.

2.2.5 Microtome

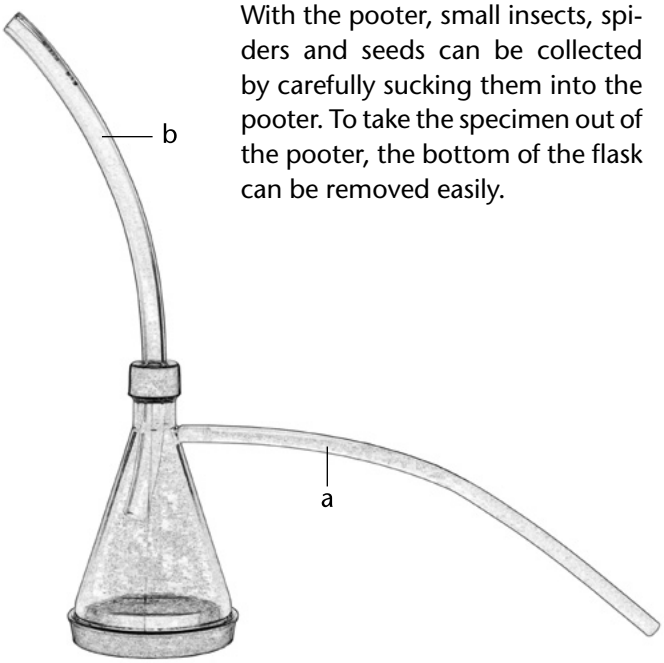
The microtome is a very safe and easy to handle instrument to sectioning biological material. With the knife a suitable piece of botanical material or dead animal is cut. This piece of material is passed through one of the openings of the microtome. It may be hold by the tweezers. Now the handle is turned to cut of a thin section from the material. The section can be taken by the tweezers and then prepared for further investigations.

Changing the blade of the microtome
(Has to be carried out by the teacher only!)

When the blade becomes edgeless it can easily changed with a common razor blade. The handle is to be hold tight in one hand and at the same time, the screw with the washer is removed by a suitable screwdriver. The used blade is to be taken out carefully. The new blade is inserted so that the bars of the handle engage with the openings of the blade. Then, the handle is screwed again together with the plastic washer.

2.2.6 Pooter for small insects

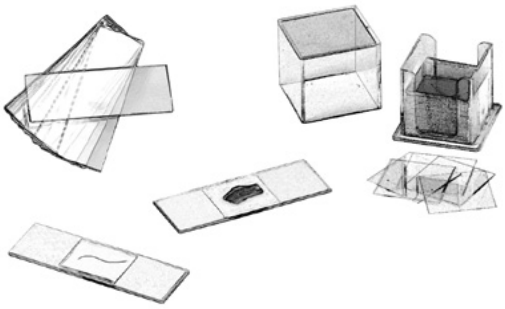
With the pooter, small insects, spiders and seeds can be collected by carefully sucking them into the pooter. To take the specimen out of the pooter, the bottom of the flask can be removed easily.



Assembly and use of the pooter

The kit contains two different types of plastic tubes. The thinner one is plugged on the sideward suction pipe, the thicker one is plugged through the top opening into the lower third of the flask. To collect a specimen, the end of the thicker tube is placed next to the e.g. insect and then it is sucked on the thinner tube. Please take care neither to get specimen into your mouth nor to injure the animals. You can get at your specimen when you cautiously remove the bottom of the flask.

2.2.7 Preparing a specimen to be viewed on a microscope

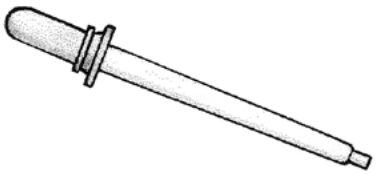


Objects that are going to be viewed on a microscope slide may be prepared as a wet mount using water. The specimen e.g. a cut from a plant stem is placed in the centre of the microscopic slide. Then a drop of water is added and a cover glass is carefully placed over avoiding the inclusion of air bubbles. The cover glass is held in place by the adhesive force of the water.

Now, the object can be viewed easily on the microscope.

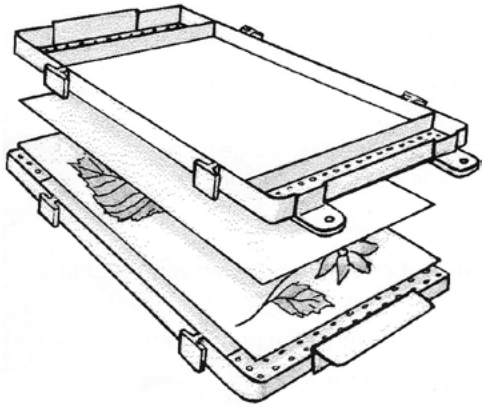
2.2.8 Dropper

The dropper is used for occasional moistening of the seeds and for wetting the microscopic slides. The dropper is also suitable for distributing oil on a water surface.

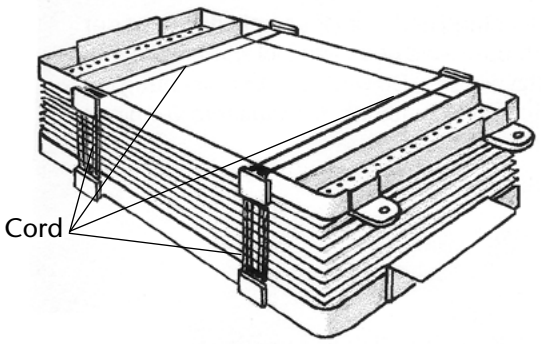


Please note: after a dropper has been used for distributing oil, it should be cleaned with warm water and marked with a label "Oil" for further use. It may be stored with the bottle of oil.

2.2.9 Flower and leaf press



Assembly and use: Lay both flat surfaces together with the protruding "feet" facing opposite ends. Each object to be pressed should be kept between two pieces of absorbent paper (e.g. "blotting-paper"). About 60 cm of cord tied around the cord holders is sufficient to firmly pull together the pressing surfaces, even when there are many layers.



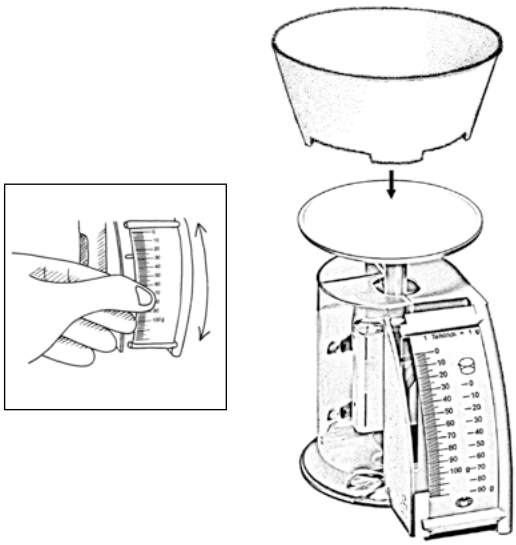
If only a few specimens are to be pressed, lay some additional sheets of newspaper between the absorbent papers, to help accelerate the process of evaporation. If many specimens (about 12 layers) are placed on top of each other, it is advisable to tighten the cord from time to time. Should the specimens be very moist, it is useful to replace the old absorbent papers with fresh ones after a short time.

Activity suggestions:

- Create a herbarium.
- Pressing flowers and other plant parts with one and two cotyledons (seed leaves) for comparison.
- Identifying differences in the shapes of leaves (e.g. wild flowers).
- Comparison of flower petals of peas and beans.
- Classifying the petals of a plant according to their size (e.g. comparison of a fading garden rose and wild rose).
- Comparison of the leaves of one type of plant taken from different locations (dandelion, plantain, lady's smock).

- Pressing different kinds of grass, ears of grains (differentiation of species), and roots.
- Demonstrating the process of progressive leaf colouring in pressed leaves.
- Demonstrating different stages of growth of germinating plants (e.g. bean, wheat) by pressing every day or every second day a germinating plant.

2.2.10 Rapid scale with removable pan



If bulky goods are to be weighed, it is advisable to do this without the pan.

The necessary calibrating of the scale may be made by moving the dial.

Activity suggestions:

- Determining increase and decrease of moisture in bulbs, plant parts and mosses.
- Weighing seeds and other parts of plants.
- Finding weight differences of eggs.
- Weighing small animals in order to measure weight increases (e.g. young mice in captivity).

2.2.11 Cloths

Damp cloths should be dried thoroughly after equipment has been cleaned and dried. They should always be stored in the resealable plastic bags.

2.2.12 Adhesive plasters

Plasters are included in different sizes. The skin must be dry before applying.

3 Recommended supplementary equipment:

(not included in the delivery)

3.1 Science Kit "Germination-Units" 18085

With the germination sets, the students can study germination of various seeds, watch and compare the influence of the environment.

With the dark room germination box, the growth of a plant towards the light can be shown in an impressive way.

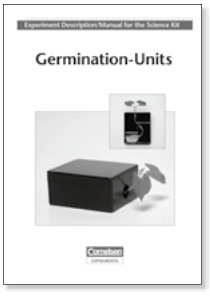
The germination sets including air-permeable lid (for use as a small aquarium or terrarium) and accessories cover a wide field of activities.

Small fishes, beetles and worms and insects may be held in the multi purpose container of the germination unit for observation.

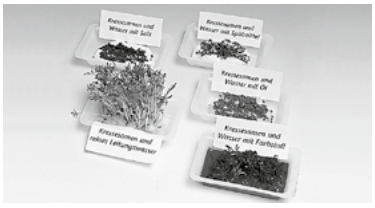
Important learning aims:

- Seeds germinating
- Growth of plants, roots and stems under various influences
- Reaction of plants to certain environmental factors
- Phototropism, geotropism
- Behaviour of animals when fed

Size of kit: 540 x 450 x 150 mm



Manual 'Germination-Units' 18085 6



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