M640X

STUDENT MICROSCOPE
MICROSCOPE D'ÉTUDIANT
MICROSCOPIO DE ESTUDIANTE

AA x2
NOT INCLUDED
NON INCLUSES
NO INCLUIDAS

8+

⚠ WARNING:
KEEP MAGNIFYING GLASS AWAY FROM DIRECT SUNLIGHT AND WINDOWS.

⚠ AVERTISSEMENT :
LA LOUPE DOIT ÊTRE TENUE À L'ÉCART DES RAYONS DIRECTS DU SOLEIL ET DES FENÊTRES.

⚠ ADVERTENCIA:
NO EXPONGA LA LUPA A LA LUZ SOLAR DIRECTA NI LA SITÚE CERCA DE UNA VENTANA

TOTAL NET WT. OF ACCESSORIES/POIDS NET TOTAL DU ACCESSOIRES/ PESO NETO TOTAL DEL ACCESORIOS: 4.13 OZ (117 g)

Contents:

- Microscope
- Slide case
- 1 prepared slide
- 8 blank slides
- 8 slide covers
- 8 labels
- 2 collection vials
- Pipette
- Tweezers
- Graduated cylinder
- Shrimp hatchery
- Yeast

M640x Microscope Set

Supervision by Adults

Read and follow the instructions, safety rules and first aid information.

This Microscope set is intended for children over the age of 8 years. Children should only use this device under adult supervision. Never leave a child unsupervised with this device.

Accessories in this experimental kit may have sharp edges and tips. Please store the device and all of its accessories and aids out of the reach of young children when not being used due to a risk of INJURY.

This device contains electronic components that are powered by batteries. Never leave a child unsupervised with this device. Batteries should be kept out of children's reach. When inserting batteries please ensure the polarity is correct. Insert the batteries according to the displayed +/- information.

Fire/Danger of Explosion

Do not expose the device to high temperatures. Use only battery types recommended. Never mix old and new batteries (replace all batteries at the same time). Never mix Alkaline, standard (Carbon Zinc) or rechargable batteries. Never short circuit the device or batteries or throw into a fire. Exposure to high temperatures or misuse of the device can lead to short circuits, fire or even explosion. Leaking or damaged batteries can cause injury if they come into contact with the skin. If you need to handle such batteries please wear suitable safety gloves.

Chemicals

Any chemicals and liquids used in preparing, using, or cleaning should be kept out of reach of children. Do not drink any chemicals. Hands should be washed thoroughly under running water after use. In case of accidental contact with the eyes or mouth rinse with water. Seek medical treatment for ailments arising from contact with the chemical substances and take the chemicals with you to the doctor.

Risk of Material Damage

Never take the device apart. Please consult our service center and send the device in for repair if needed.

Do not subject the device to temperatures exceeding 140˚F.

Tips on Cleaning

Remove batteries from device before cleaning.

Microscope Care

Clean the exterior of device with a dry cloth. Do not use cleaning fluids so as to avoid causing damage to electronic components. Clean the lens (objective and eyepiece) only with a soft lint-free cloth (e.g., microfiber). Do not use excessive pressure - this may scratch the lens. Protect the device from dust and moisture. Store the device in its original packaging. Batteries should be removed from the device if not used for a long period of time.

Disposal

Keep packaging materials (plastic bags, rubber bands, etc.) away from children. There is a risk of SUFFOCATION.

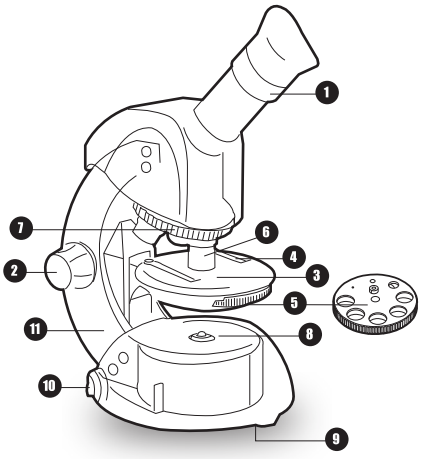
Dispose of packaging materials as legally required. Consult the local authority on the matter if necessary.

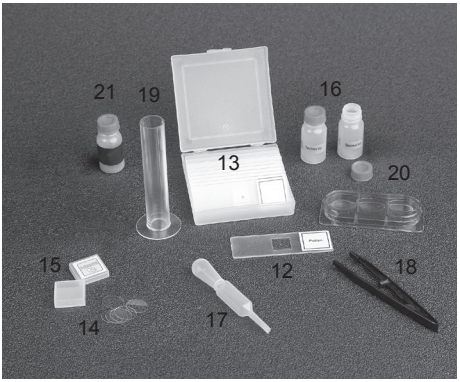
DISPOSAL
Dispose of the packaging materials properly, according to their type, such as paper or cardboard. Contact your local waste-disposal service or environmental authority for information on the proper disposal.

Please take the current legal regulations into account when disposing of your device. You can get more information on the proper disposal from your local waste-disposal service or environmental authority.

Product Manual Visit

www.exploreone.com/pages/product-manuals





The Parts of Your Microscope:

1) Zoom eyepiece
2) Focus knob
3) Stage
4) Metal stage clips
5) Aperture wheel
6) 4x, 10x, 40x objectives
7) Objective turret
8) LED illumination
9) Base with battery compartment
10) ON/OFF switch
11) Microscope arm

Additional Contents:

12) 1 prepared slide
13) 8 blank slides
14) 8 slide covers
15) 8 labels
16) 2 collection vials
17) Pipette
18) Tweezers
19) Graduated cylinder
20) Shrimp hatchery
21) Yeast

Congratulations! You've chosen one of the highest quality microscopes available for young explorers. Read the following instructions carefully to get the greatest benefit from your precision instrument. Then try out the experiments to begin your investigation of the fascinating world around you.

How Do I Use My Microscope?

Before you use your microscope, make sure that the table, desk or whatever surface that you want to place it on is stable, and is not subject to vibration. If the microscope does need to be moved handle the microscope by the arm and base while carefully transferring it.

Install two "AA" batteries (not included) in the battery box, located in the base of the microscope. Open battery door and insert the batteries according to the displayed +/- information. Snap-close the battery compartment door.

Once the microscope is in a suitable location and batteries installed, check the light source to make sure that it illuminates. Use a cleaning cloth (e.g., microfiber) to gently wipe the lenses off. If the stage is dirty with dust or oil, carefully clean it off. Make sure that the stage is raised and lowered only by using the focus adjustment knob.

How Do I Operate the LED Illumination?

Locate the ON/OFF switch on the base of the microscope. Flip the switch to the on position and the light will illuminate. This microscope is equipped with modern LED lighting (a light-emitting diode) that illuminates the specimen from below. The aperture wheel (Fig. 5) is located in the middle of the microscope stage (Fig. 3). They help you when you are observing very bright or clear specimens. Using these filters, you can choose from various brightness levels. This helps you better recognize the components of colorless or transparent objects (e.g., grains of starch, protozoa).

How Do I Adjust My Microscope Correctly?

Place in a suitable location as described previously and sit in a comfortable viewing position. Each observation starts with the lowest magnification. Adjust the microscope stage (Fig. 3) so that the stage is at the lowest position. Then turn the objective turret (Fig. 7) until it clicks into place at the lowest magnification (objective 4x). Note: Before you change the objective setting, always move the microscope stage (Fig. 3) to its lowest position. This way, you can avoid causing any damage to the slide or microscope. Make sure the zoom eyepiece (Fig. 1) is also in the fully lowered position.

Note: *The highest magnification is not always the best for every specimen.*

Magnification Guide		
Zoom Eyepiece	**Objective**	**Power**
10-16X	**4x**	**40-64X**
10-16X	**10x**	**100-160X**
10-16X	**40x**	**400-640X**

How do I observe the specimen?

Sitting in your location with adequate illumination chosen from the aperture filter wheel, the following basic rules are to be observed: Start with a simple observation at the lowest magnification. This way, it is easier to position the object in the middle (centering) and make the image sharp (focusing). The higher the magnification, the more light you will require for good image quality.

Quick Fact *- The item you want to observe with the microscope is known as the object or specimen.*

Now place the prepared slide directly under the objective on the microscope stage (Fig. 3) securing with the stage clips (Fig 4). The object/specimen should be located directly over the illumination (Fig. 8). At this point, take a look through the eyepiece and carefully turn the focus knob (Fig. 2) until the image appears clear and sharp. Now you can select a higher magnification by slowly turning the zoom eyepiece (Fig. 1). When the zoom lens is completely turned out, the magnification is increased by 62%. If you would like an even higher level of magnification, turn the objective turret (Fig. 7) to a higher setting (10x or 40x). Please note: You should return the zoom to lowest power of magnification.

Note: You should always lower the stage and return the zoom to lowest power when rotating the objective turret.

Each time the magnification changes (eyepiece or objective change), the image sharpness must be readjusted with the focus knob (Fig. 2). When doing this, make sure to be careful; if you move the microscope stage too quickly, the objective and the slide could come into contact and cause damage to the slide or the microscope.

For transparent objects (e.g., protozoa), the light shines from below, through the opening in the microscope stage and then through the object. The light travels further through the objective and eyepiece, where it is also magnified, and finally goes into the eye. This is transmitted light microscopy. Many microorganisms in water, many plant components and the smallest animal parts are already transparent in nature. Opaque specimens, on the other hand, will need to be prepared for viewing. Opaque specimens can be made transparent by a process of treatment and penetration with the correct materials (media), or by slicing. You can read more about creating specimens in the following sections.

Troubleshooting Table

Problem	Solution
No recognizable image	Turn on light Readjust focus Start with the lowest power objective (4X) & lowest power eyepiece (10X)
No Image	Center object on slide Start with the lowest power objective (4X) & lowest power eyepiece (10X)
No Light	Replace batteries Check ON/OFF position

Cleaning Tips

To ensure your microscope has a long service life, clean the lens (objective and eyepiece) only with soft lint free cloth (e.g., microfiber). Do not press hard as this might scratch the lens. Ask your parents to help if your microscope is really dirty. The cleaning cloth should be moistened with cleaning fluid and the lens wiped clean using very little pressure. Make sure your microscope is always protected against dust and dirt. After use, leave it in a warm room to dry off.

This microscope can be the gateway to a fun, creative, learning process and will open the door to advanced knowledge of the world around you. It allows you to explore the various fields of science from Biology to Botany to Chemistry and beyond, so have fun exploring the exciting world of science.

Experiment Instructions

WARNING
- Keep chemicals and corrosive liquids out of the reach of children.
- Do not ingest any chemicals.
- Wash your hands thoroughly with soap under running water after use.

Introduction

Here are a few tips about how to take a better look at the wonderful world of microorganisms and crystals. For example, you will learn how to prepare your object, so that you can look at it with the microscope. The numerous experiments described should make you curious and want to use your microscope more.

What Kind of Objects?

With a magnifying glass, you can look at non-transparent (i.e, opaque) objects—for example, small animals, parts of plants, tissues, etc. Here, the light falls onto the object and is reflected back through the magnifying lens and into your eye. With your microscope, however, you can observe transparent objects, in which the light from the lamp goes through the opening on the stage and your prepared specimen. Then it passes through the objective, the body of the microscope and the eyepiece into your eye. In this way, the microscope is only meant for observing transparent objects. Many microorganisms in water, parts of plants and the tiniest animal parts are naturally transparent. For other things, we must make them transparent. We may make them transparent through a treatment or penetration with the right materials (media), or by taking the thinnest slices from them (using our hand or a specimen slicer), and then examine them. You'll now find out how this is done.

How to Produce Thin Specimen Slices

WARNING
Only do this with an adult's supervision. Ask your parents to help you. As already mentioned, you need to get the thinnest slices possible from an object so that they are transparent and can be looked at under the microscope. First, you'll need a simple candle. Place the wax from the candle in an old pot and heat it on the stovetop until it becomes liquid. Now, use tweezers to dip the object in the liquid wax a few times. The wax is very hot. Be careful. After each dip, allow the wax to harden and then dip the object into the wax again. When the wax around the object has hardened completely, you can use the specimen slicer to cut thin slices from it. These slices are to be laid on a slide and covered with a cover slip.

The Production of Specimens

There are two basic types of specimens: Permanent specimens and short-term specimens.

Short-term Specimens

Short-term specimens are produced from objects that you want to look at, but don't want to keep in your specimen collection. These specimens are only meant to be observed for a short period of time, after which they are disposed of. For short-term specimens, place the object on the slide and place a cover slip on top of it. After looking at the object, clean the slide and cover slip. One of the secrets of successful observation with microscope is the use of clean slides and cover slips. Spots or stains would only distract you when looking at an object.

Permanent Prepared Specimens

Permanent prepared specimens are produced from objects that you would like to look at again and again. The preparation of dry objects (pollen, the wings of a fly, etc.) can only be done with special glue. You'll find such glue at a local hobby store or online, identified as "gum media." Objects that contain liquid must first have the liquid taken out of them.

How to Prepare a Dry Object

First, place the object in the middle of a clean slide and cover it with a drop of glue (gum media). Then place a cover slip on the object that is covered in the chemical. Lightly press the cover slip so that the glue spreads to the edges. Now you have to let the specimen harden for 2-3 days. Only then is the specimen firmly glued so you will be able to use it.

How to Prepare a Smear Specimen

For a smear specimen, a drop of the liquid to be observed (e.g., water from a puddle in the forest) is placed on the end of the slide using a pipette. Then you can smear the liquid across the slide with the help of a second slide. Before observing, let the substance dry together for a few minutes.

Experiments

Experiment No. 1:
Black and White Print
Objects:
• Small piece of paper from a newspaper with a black and white picture and some text
• Similar piece of paper from a magazine with color pictures and text

In order to observe the letters and the pictures, produce a short-term slide from each object. Now, set your microscope to the lowest magnification and use the specimen from the newspaper. The letters on the newspaper look frayed and broken, since they are printed on raw, low-quality paper. The letters on the magazine look smoother and more complete. The pictures in the newspaper are made up of many tiny dots, which appear slightly smudgy. The halftone dots of the magazine picture are clearly defined.

Experiment No. 2:
Color Print
Objects:
• Small piece of color-printed newspaper.
• Similar piece of paper from a magazine.

Make short-term specimens from the objects and observe them with the lowest magnification. The colored halftone dots of the newspaper often overlap. Sometimes, you'll even notice two colors in one dot. In the magazine, the dots appear clear and rich in contrast. Look at the different sizes of the dots.

Experiment No. 3:
Textile Fibers
Objects and Accessories:
• Threads from various fabrics (e.g., cotton, linen, wool, silk, rayon, nylon, etc.).
• 2 needles.

Each thread is placed on a slide and frayed with the help of the two needles. Next, wet the threads and cover them with a cover slip. Set the microscope to one of the lower magnifications. Cotton fibers come from a plant, and look like a flat, twisted ribbon under the microscope. The fibers are thicker and rounder at the edges than in the middle. Cotton fibers are basically long, collapsed tubes.

Linen fibers also come from a plant, and they are round and run in one direction. The fibers shine like silk and exhibit countless bulges on the thread. Silk comes from an animal and is made up of solid fibers that are small in diameter, in contrast to the hollow plant-based fibers. Each fiber is smooth and even and looks like a tiny glass tube.

The fibers of the wool also come from an animal. The surface is made of overlapping sleeves that look broken and wavy. If possible, compare wool from different weaving mills. In doing so, take a look at the different appearance of the fibers. Experts can determine which country the wool came from by doing this.

Rayon is a synthetic material that is produced by a long chemical process. All the fibers have solid, dark lines on the smooth, shiny surface. After drying, the fibers curl into the same position. Observe the differences and the similarities.

Experiment No. 4:
Table Salt
Object:
• Common table salt

First, place a few grains of salt on a slide and observe the salt crystals with the lowest setting of your microscope. The crystals are tiny cubes and are all the same shape.

Experiment No. 5:
Production of Salt Crystals
Objects and Accessories:
• Table salt
• A graduated cylinder filled halfway with warm water to dissolve the salt
• Cotton thread
• Paper clips
• A matchstick or pencil

Add salt to the water until it no longer dissolves. You now have a saturated salt solution. Wait until the water has cooled. Fix a paper clip to the end of the cotton thread. The paper clip serves as a weight. Tie the other end of the cotton thread into a knot around the match, and dip the end with the paper clip in the salt solution. Place the match horizontally on top of the test tube. It prevents the cotton thread from slipping all the way down into the test tube. Now, place the tube in a warm place for 3-4 days. If you take a look at the glass after a few days under the microscope, you can see that a little colony of salt crystals has formed on the cotton thread.

Experiment No. 6:
How do you raise Brine Shrimp?
Accessories (from your microscope set):
• Shrimp eggs (not included)
• Sea salt
• Hatchery
• Yeast

Brine Shrimp, or "Artemia Salina" as they are called by scientists, have an unusual and interesting life cycle. The eggs produced by the female are hatched without ever being fertilized by a male shrimp. The shrimp that hatch from these eggs are all females. In unusual circumstances (e.g., when the marsh dries up), the male shrimp can hatch. These males fertilize the eggs of the females and from this mating, special eggs are produced. These eggs, called "winter eggs," have a thick shell, which protects them. The winter eggs are very resistant and capable of survival, even if the marsh or lake dries out, killing off

the entire shrimp population. The winter eggs can exist for 5-10 years in a “sleep” status and will only hatch when the proper environmental conditions occur. These are the type of eggs you have in your microscope set.

The Incubation of the Brine Shrimp

In order to incubate the shrimp, you first need to create a salt solution that corresponds to the living conditions of the shrimp. For this, put a half liter of rain or tap water in a container. Let the water sit for approx. 30 hours. Since the water evaporates over time, it is advisable to fill a second container with water and let it sit for 36 hours. After the water has sat stagnant for this period of time, add half of the included sea salt to the container and stir it until all of the salt is dissolved. Now, put a few eggs in the container and cover it with a dish. Place the glass container in a bright location, but don‘t put it in direct sunlight. Since you have a hatchery, you can also add the salt solution along with a few eggs to each of the four compartments of the tank. The temperature should be around 25ºF. At this temperature, the shrimps will hatch in about 2-3 days. If the water in the glass evaporates, add some water from the second container.

The Brine Shrimp under the Microscope

The animal that hatches from the egg is known by the name “Nauplius Larva”. With the help of a pipette, you can place a few of these larvae on a glass slide and observe them. The larvae will move around in the salt water by using their hair-like appendages. Take a few larvae from the container each day and observe them under the microscope. In case you’ve hatched the larvae in a hatchery, simply take off the cover of the tank and place the tank on the stage. Depending on the room temperature, the larvae will be mature in 6-10 weeks. Soon, you will have had raised a whole generation of brine shrimp, which will constantly grow in numbers.

Feeding your Brine Shrimp

In order to keep the brine shrimp alive, they must be fed from time to time, of course. This must be done carefully, since overfeeding can make the water become foul and poison the shrimp population in the habitat. The feeding is done with dry yeast in powdered form. A little bit of this yeast every second day is enough. If the water in the compartments of the hatchery or your container turns dark, that is a sign that it is gone bad. Take the shrimp out of the water right away and place them in a fresh salt solution.

Warning: The shrimp eggs and the shrimp are not meant to be eaten.

Warning- The lens contains lead that may be harmful. Wash hands after touching.

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