NATIONAL GEOGRAPHIC™

40 1024X Microscope Set

CAUTION:
Never attempt observing the sun with this telescope! Especially keep it in mind while the telescope is used by children! Observing the sun – even for a very short time – will cause blindness!
Packing material (plastic bags, etc.) has to be kept out of reach of children!

RISK to your child!
Never look through this device directly at or near the sun. There is a risk of **BLINDING YOURSELF!**

Children should only use this device under supervision. Keep packaging materials (plastic bags, etc.) away from children. There is a risk of **SUFFOCATION!**

Fire/Burning RISK!
Never subject the device - especially the lenses - to direct sunlight. Light ray concentration can cause fires and/or burns.

RISK of material damage!
Never take the device apart. Please consult your Customer Service if there are any defects. The dealer will contact 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
Clean the lens (objective and eyepiece) only with a soft lint-free cloth (e.g. micro-fibre). Do not use excessive pressure - this may scratch the lens.

Dampen the cleaning cloth with a spectacle cleaning fluid and use it on very dirty lenses.

Protect the device against dirt and dust. Leave it to dry properly after use at room temperature. Then put the dust caps on and store the device in the case provided.

RESPECT Privacy!
This device is meant for private use. Respect others‘ privacy – do not use the device to look into other people‘s homes, for example.

DISPOSAL
Dispose of the packaging material/s as legally required. Consult the local authority on the matter if necessary.

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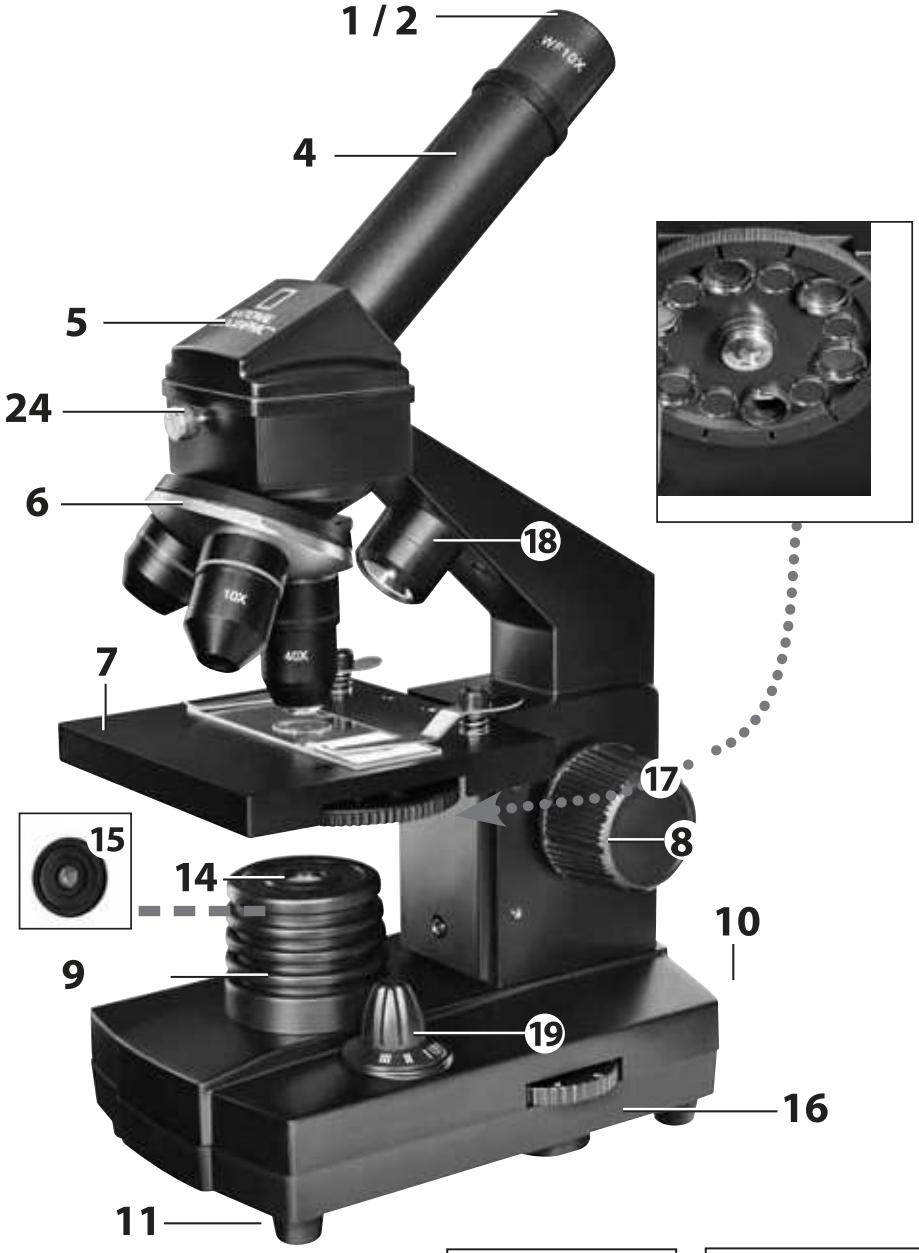

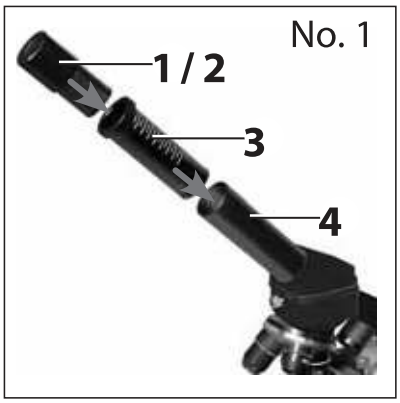

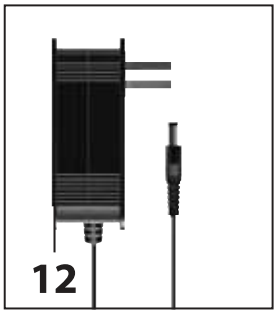

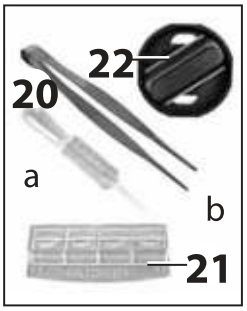

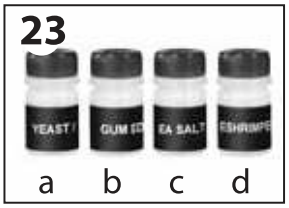

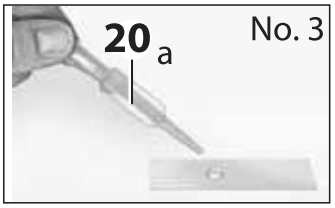

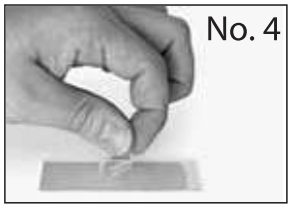

Need Help? Toll Free 866-252-3811

CAUTION!
For working with this equipment, sharp edged and pointed aids are frequently used.
Therefore keep this equipment, as well as all accessories and aids, in a place inaccessible to children.
Only allow children to work with the equipment under supervision!
Keep packing materials (plastic bags, rubber bands, etc.) away from children!

For further inquiries and any complaints, in the first instance please contact the service center responsible for your country, by telephone. You will find the service addresses in these instructions.

Operating instructions

Parts overview:

1 10X WF eyepiece
2 16X WF eyepiece
3 Barlow lens 2X
4 Eyepiece holder
5 Microscope head
6 Objective revolver
7 Microscope stage
8 Focus wheel
9 LED lighting (transmitted light)
10 Electricity supply
11 Microscope base
12 Main plug
13 5 slides, 10 covering glasses and 5 preparations in a plastic box
14 Matted lens
15 Condenser lens
16 Dimmer
17 Color filter disc
18 LED lighting (reflected light)
19 Direct light/transmitted light switch
20 Microscope tools: a) pipette; b) tweezers
21 Hatchery
22 MicroCut
23 Specimens: a) yeast; b) gum media (specimen inclusion medium): c) sea salt; d) brine shrimp eggs
24 Locking screw

1. General/Location

Make sure you position your microscope on a stable, solid surface.

An electricity supply is required for observation with the electric illuminator.

Position your device so that it can be disconnected from the power supply at any time. The wall you use socket should be located near the device and easily accessible, since the plug on the power cord serves as a disconnecting device for the power supply. Always pull on the plug to separate the device from the power supply. Never pull on the cord.

2. Electric LED lighting with dimmer

Before use, make sure the light switch (19) is set to 'off'.

The microscope has two light sources. Lighting can be of three types. Set the switch (19) to 'II' to light the specimen from above (refl ected light) or 'I' to light it from below (transmitted light). Use setting 'III' to light the specimen simultaneously by transmitted and refl ected light. The transmitted light unit (9) is used for transparent specimens (those on glass slides). To view solid, non-transparent specimens, use the refl ected light unit (18). Use of both forms of lighting simultaneously is only recommended for semitransparent specimens. This operating mode is not recommended for transmitted light specimens on slides as it may cause refl ection on the slide.

To operate the supplied main power pack (12), fi rst connect it to the microscope and then to a power socket (220-230V). Use the switch (19) to select the desired lighting mode and set the dimmer (16) to the desired brightness.

As your device has continuously controllable lighting (dimmer), optimal illumination of the object to be viewed is guaranteed.

3. Colour filter disc

The colour fi lter (17) under the microscope table (7) aids in viewing very bright and transparent objects. Just select the right colour for the specimen in question. The

components of colourless or transparent objects (e.g. starch particles, single-cell specimens) can thus be better recognised.

4. Interchangeable illumination lenses
Your microscope comes with two illumination lenses (14 and 15). Depending on the object to be viewed, the proper lens should be attached to the LED illumination (9). The ground glass, or matted lens (14) is already mounted on the lighting unit. To change the lenses, simply screw one off and the other on by turning the upper part of the transmitted light unit (9) (see also page 11).

An overview of lens purposes:
The matted lens (14) should be used for
. viewing extremely small items with the eyepieces (1 and 2) and the Barlow lens (3).
The condenser lens (15) should be used for
. viewing standard items withthe eyepieces (1 and 2) and the Barlow lens (3).

5. Microscope setup
The microscope head (5) will now be prepared for your fi rst observation.
First, loosen the screw (24) and rotate the head into a convenient position.
Begin every observation with the lowest magnifi cation.
Place the microscope's table (7) with the focus knob (8) into the lowest position and rotate the objective revolver (6) until it locks on the lowest magnifi cation (4X).

NOTE:
Make sure to place the microscope's table (7) in its lowest position before changing the objective in order to prevent damage to the microscope.

Insert the 10X eyepiece (No. 1, 1) in the Barlow lens (No. 1, 3).
Take care that the Barlow lens is inserted completely into the monocular head (No. 1, 4).

6. Observation
After you have set up the microscope with the proper illumination, the following principles are important:

Begin each observation at the lowest magnification, so that the center and position of the object to be viewed is in focus. The higher the magnifi cation, the more light is required for good picture quality.

Place a permanent slide culture directly under the microscope lens on the plate (7).
The specimen to be examined must be directly over the lighting.

Look through the eyepiece (1 and 2) and carefully turn the focus wheel (8) until you can see a sharp picture.

Now you can progress to a higher magnifi cation. Slowly pull the Barlow lens (No. 2, 3) out of the monocular barrel (No. 2, 4). When the Barlow lens is nearly entirely pulled out, the magnifi cation is raised to 2X.

For even higher magnifi cation, you can put the 16X eyepiece (2) into the objective revolver (6) and rotate the objective revolver to a higher magnifi cation (10X or 40X).

TIP:
Depending on the preparation, higher magnifi cations do not always lead to better pictures.

When changing the magnifi cation of your microscope by changing or adjusting the eyepiece, objective lens or Barlow lens, you must readjust the focus wheel (8) to sharpen the image.

NOTE:
Please be very careful when doing this. If you move the mechanical plate upward too fast, the objective lens and the slide can touch and become damaged.

7. Condition and prepare viewed objects

7.1. Condition
With the Barlow lens nearly fully extended, your microscope's magnifi cation can be doubled. Both transparent and non-transparent specimens can be examined with this microscope, which features both direct and transmitted light. If opaque specimens are being examined, such as small animals, plant parts, tissues, stones and the like, the light is refl ected from the specimen, through the lens and eyepiece, where it is magnifi ed, to the eye (refl ected light principle, switch position I). If opaque specimens are being examined, the light from below goes through the speci-

men, lens and eyepiece to the eye and is magnifi ed en route (direct light principle, switch position II).

Some small water organisms, plant parts and animal components are transparent by nature, but many others require pretreatment — that is, you need to make a thinnest possible slice of the object by hand cutting or using a microtome, and then examine this sample.

7.2. Creation of thin preparation cuts
Specimens should be sliced as thin as possible. A little wax or paraffi n is needed to achieve the best results. Put the wax into a heat-safe bowl and heat it over a flame until the wax is melted. You can use a candle fl ame to melt the wax.

DANGER!
Be exremely carfeful when dealing with hot wax, as there is a danger of being burned.

Then, dip the specimen several times in the liquid wax. Allow the wax that encases the specimen to harden. Use a MicroCut (22) or other small knife or scalpel to make very thin slices of the object in its wax casing.

DANGER!
Be extremely careful when using the MicroCut, knife or scalpel. These instruments are very sharp and pose a risk of injury.

Place the slices on a glass slide and cover them with another slide before attempting to view them with the microscope.

7.3. Creation of your own preparation
Put the object to be observed on a glass slide and cover the object with a drop of distilled water (No. 3) using the pipette (No. 3, 20a).

Set a cover glass (available at a well-stocked hobby shop) perpendicular to the edge of the water drop, so that the water runs along the edge of the cover glass (No. 4). Now lower now the cover glass slowly over the water drop.

8. Experiments

Now that you're familiar with your microscope's functions and how to prepare slides, you can complete the following experiments and observe the results under your microscope.

8.1. Newspaper print

Objects:
1. A small piece of paper from a newspaper with parts of a picture and some letters
2. A similar piece of paper from an illustrated magazine:
Use your microscope at the lowest magnifi cation and make a slide preparation from each object. Place the slide with the newspaper on the microscope table and observe the slide. The letters in the newspaper appear broken because the newspaper is printed on raw, inferior paper. Now observe the slide with the magazine preparation. Letters of the magazine appear smoother and more complete. The picture from the newspaper consists of many small points, which appear somewhat dirty. The pixels (raster points) of the magazine image appear sharper.

8.2. Textile fibers
Objects and accessories:
1. Threads of different textiles: Cotton, linen, wool, silk, Celanese, nylon and any others you can find.
2. Two needles:
Put each thread on a glass slide and fray each with the help of the two needles. Put a drop of water over each thread with the pipette and cover each with a cover glass. Adjust the microscope to a low magnifi cation. Cotton fi bres are of plant origin and look, under the microscope, like a flat, twisted band. The fi bres are thicker and rounder at the edges than in the centre. Cotton fi bres consist primarily of long, collapsed tubes. Linen fi bres are also of plant origin; they are round and run in straight lines. The fi bres shine like silk and exhibit numerous swellings along the shaft of the fi bre. Silk is of animal origin and consists of solid fibres of smaller diameter than the hollow vegetable fi bres. Each silk fi bre is smooth and even and has the appearance of a small glass rod. Wool fi bres are also of animal origin; the surface consists of overlapping scales, which appear broken and wavy. If possible, compare wool fibres from different weaving mills, and note the differences in the appearance of the fibres. Experts can determine the country of origin of wool based on its appearance under a microscope. Celanese is artifi cially manufactured by a long chemical process. All Celanese fibres show hard, dark lines on a smooth, shining surface.

The fibres crinkle in the same way after drying. Observe the similarities and differences between the different fibres.

8.3. Saltwater brine shrimps
Accessories:
1. Brine shrimp eggs (23d)
2. Sea salt (23c)
3. Hatchery (21)
4. Yeast (23a)

> **!** CAREFUL!
> These eggs are not fit for human consumption.

8.3.1. Winter eggs of Artemia salina
Artemia salina are species of brine shrimp typically found in salt lakes — bodies of water with a higher salinity than even the ocean. During a drought, a salt lake can become a hostile habitat for organisms, and entire populations of Artemia salina sometimes die off. During drought conditions, to ensure that the species will repopulate the salt lake when the drought ends, Artemia salina lay thick-shelled eggs called winter eggs that can survive for up to ten years in a dormant state. Winter eggs can withstand heat, cold and chemicals. These eggs hatch when favourable conditions return to their ambient environment. The eggs provided (23d) are of this type.

8.3.2. Hatching winter eggs
To hatch the brine shrimps, create a solution with an appropriate salinity and temperature. First, fi ll two containers with a half litre of freshwater each, and let them both stand for about thirty hours. Next, pour half of the provided salt (23c) into one container and stir the solution until the salt dissolves. Pour some of this solution into the hatchery (21). Place a few eggs close to the lid. Position the hatchery somewhere with plenty of light but not in direct sunlight. The ambient temperature should ideally hover around 25 °C. As water in the hatchery evaporates, gradually add freshwater from the second container. After two to three days, the eggs will hatch brine shrimp larvae, called nauplii.

8.3.3. Observing Artemia salina under a microscope
Using the pipette (20a), move some larvae from the container to a microscope slide for examination. When viewing the larvae, you'll notice that they swim through the solution using hairlike limbs! Each day, examine a few more. You can even view the entire hatchery under the microscope if you remove its lid. The larvae will mature in six to ten weeks, depending on the temperature of the water. Soon, you will have an entire generation of saltwater brine shrimps that reproduce frequently!

8.3.4. Feeding your Artemia salina
Feed your brine shrimps often to keep them alive. The best food is dry powdered yeast (23a). Give them some every other day. Be careful not to overfeed them, as doing so can cause the water to stagnate and poison the brine shrimps. If the water does begin to stagnate (you'll see it darkening), transfer the brine shrimps to the fresh saline solution you have prepared earlier (see 8.3.2).

Care and maintenance
Before cleaning, separate the device from the power supply by removing the plug. Only use a dry cloth to clean the exterior of the device.

> **!** NOTE:
> Do not use any cleaning fl uid to avoid damaging the electronics.

Clean the lenses eyepieces and lenses only with a soft, lint-free cloth, like a microfi bre cloth.

> **!** NOTE:
> Do not apply excess pressure to the cloth so as to avoid scratching the lenses.

To remove more stubborn dirt, moisten the cleaning cloth with an eyeglass-cleaing solution and wipe the lenses gently. Protect the device from dust and moisture. After use, particularly in high humidity, let the device acclimatize for a short period of time, so that the residual moisture can dissipate before storing.

Troubleshooting

Problem	Solution
No picture visible	• Switch light on. . Put condenser lens in place. . Adjust for us.

Magnification table

Eyepiece	Objective	Magnification	with Barlow lens
10X	4X	40X	80X
10X	10X	100X	200X
10X	40X	400X	800X
16X	4X	64X	128X
16X	10X	160X	320X
16X	40X	640X	1280X

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.

Do not dispose of electronic devices in the household garbage.
As per the Directive 2002/96/EC of the European Parliament on waste electrical and electronic equipment and its adaptation into German law, used electronic devices must be collected separately and recycled in an environmentally friendly manner.
Empty old batteries must be disposed of at battery collection points by the consumer. You can fi nd out more information about the disposal of devices or batteries produced after 1 June 2006 from your local waste disposal service or environmental authority.

Registration

Name: _____

Postcode/City: _____

Street: _____

Telephone: _____

Date of purchase: _____

Signature: _____

CONFORMS TO THE SAFETY
REQUIREMENTS OF ASTM F963