



**NATIONAL
GEOGRAPHIC™**

© 2014 National Geographic Society



LCD Microscope

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.

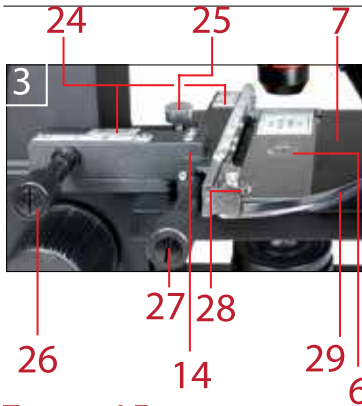
RESPECT Privacy!

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.





(GB/IE) 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.

All parts (Figs. 1-5):

- 1 Screen module
- 2 LCD monitor
- 3 Tube
- 4 Lens turret
- 5 Objective
- 6 Slide (here: prepared slides)
- 7 Microscope table
- 8 Collector lens
- 9 LED lighting (transmitted light)
- 10 Microscope foot
- 11 Operating light
- 12 On/ off switch for screen module
- 13 LED top illumination (only for use with 4x objective)
- 14 Stage
- 15 Color filter plate
- 16 Focusing wheel
- 17 Power connection
- 18 Dimmer
- 19 Lighting selector switch
- 20 Input keys
- 21 Photo button
- 22 Menu key
- 23 Change key
- 24 Vernier scales
- 25 Clamping screw
- 26 Stage drive forwards/back
- 27 Stage drive left/right
- 28 Levers for clamping mounting plate
- 29 Mounting plate clamp
- 30 Clear aperture (without color filter)
- 31 Color filter
- 32 USB cable
- 33 Box with 10 slides, 10 covers and 5 prepared slides
- 34 A) Microscope utensils; B) Pipette; C) Tweezers
- 35 Shrimp breeding enclosure
- 36 Mikrotom tissue chopper
- 37 Preparations: A) Yeast; B) Gum Arabic Media ; C) Sea salt; D) Shrimp eggs
- 38 Power supply plug
- 39 Nylon case

Note:

An SD-Memory Card is required to store your recordings (not included in delivery).

1. Location, connection types

Before you begin with the assembly of your microscope, you must select a suitable location.

First you should ensure that your microscope is set up on a stable, vibration-free surface.

Power connection (220-230 V) is required for observations using the electrical free surface.

Power connection (220-230 V) is required for observations using the electrical LED lighting and the electronic LCD eyepiece (screen module).

Furthermore the microscope possesses an interface to a PC (USB connection).

2. Start-up, electrical LED lighting

Before start-up, please check that the lighting selector switch (Fig. 1.19) is in the "OFF position".

The microscope is equipped with two LED lighting units. The lighting can take place in three ways. At the selector switch (Fig. 1.19) select position "I", in order to illuminate the object from underneath (with transmitted light), or "II", to illuminate it from above (with top illumination). With position "III" the object can be illuminated from above and below at the same time. The transmitted light unit (Fig. 1.9) is used for transparent preparations (preparations on glass slides). In order to see solid, non-transparent objects, select the top illumination unit (Fig. 1.13). The top illumination unit is only useful when using the 4x-objective. The use of both lighting at the same time is only useful with semi-transparent objects. This mode of operation is not recommended for transmitted light objects on slides, as this can lead to reflections on the slides.

To start-up, the power supply plug, which is provided, (Fig. 5.38) is connected to the power connection (Fig. 1.17) at the rear of the microscope foot (Fig. 1.10) and to a convenient outlet (220-230 V). Finally, switch on the desired lighting using the lighting selector switch and set the required brightness with the dimmer (Fig. 1.18).

Since your equipment is fitted with infinitely variable lighting (dimmer), the optimum illumination of the object to be observed is ensured.

3. Observation

3.1 Microscope observation in general

Once you have assembled the microscope and appropriately adjusted the illumination, the following principles apply:

a) Begin each observation with the lowest magnification, thus centering and positioning of the object to be observed will be easier.

Move the microscope table (Fig. 1.7), using the focusing wheel (Fig. 1.16) completely down and then turn the lens turret (Fig. 1.4) until it engages on the lowest magnification (the 4x-objective is vertical).

b) Begin with a simple observation. Place a prepared slide (Fig. 1+3.6) directly under the objective on the microscope table (Fig. 1+3.7), by clamping it into the stage (Fig. 1+3.14). For this, move the lever for the clamping mounting plate (Fig. 3.28) to the side, put the prepared slide onto the stage and carefully allow the clamping mounting plate (Fig. 3.29) to return onto the prepared slide. The object which is to be observed must be exactly above or below the illumination. In order to achieve this, there are two milled thumb screws on the stage. This is the so-called stage drive (Fig. 3.26+27). By turning

these screws it is possible to precisely position the object, in the left or right direction (Fig. 3.27) and forwards or backwards (Fig. 3.26).

c) Then switch on the LCD monitor, by pressing the power switch on the screen module (Fig. 1+2.12); the red operating light (Fig. 1+2.11) will light up. Then look at the LCD monitor (Fig. 1+2.2) and carefully turn the focusing wheel (Fig. 1.16) until the image is sharp. With the stage you can now center the object at the desired place on the LCD monitor.

d) For higher magnification turn the lens turret (Fig. 1.4) to a higher setting (objectives 10x and 40x).

Note:

Before you change the objective setting, first move the microscope table fully downwards (Fig. 1.7). This will avoid possible damage!

The higher the magnification, the more light is needed for a good image quality.

Important notes:

Depending on the preparation in use, higher magnification in individual cases will not lead to a better picture! The magnification is altered by changing the objective. This alters the sharpness of the image which must be adjusted by the focusing wheel (Fig. 1.16). Proceed here very carefully. If you raise the microscope table too quickly, the objective and the slides can touch each other and be damaged!

e) The magnification factor of the LCD eyepiece amounts to 12.5x. In combination with the 4x-objective we obtain a total magnification of 40x, i.e. 1 mm of the object is shown as 40 mm on the LCD monitor. With the 10x objective we have a total magnification of 125x, correspondingly, with the 40x objective 500x.

f) The color filter disc (Fig. 1+4.15, beneath the microscope table (Fig. 1+4.7) helps you when viewing very brightly or transparent preparations. For this please select the suitable color depending upon the object being observed. The components of colorless or transparent objects (e.g. grain containing starch, single-celled organisms) will be much easier to recognize.

3.2 Operation of the screen module

3.2.1 Observing the screen

If you switch on the LCD monitor (see section 3.1 c), you will see the live image of your object as well as five different displays:

If you've set the LCD screen option (see section 3.1 c) then you'll see a live picture of your specimen with four different entries.

- There's a camera symbol at top left (photo mode) together with the graphics resolution (number of pixels by width and height).
- Bottom left the remaining sd card memory is shown in square brackets.
- EV brightness correction is shown first bottom right. Press the up or down arrows (illustration 2.20) to adjust brightness from -1.2 (dark) to +1.2 (bright).
- The electronic zoom factor is shown second bottom right next to a magnifying glass symbol. Use the right and left arrows (illustration 2.20) to enlarge the image by factors from 1 to 4. – Maximum LCD Micro enlargement is hence $4 \times 500 = 2000x$.

3.2.2 Producing photographs

By pressing of the photo button "SNAP" (Fig. 2.21) a photograph is taken of the live image, which is stored to your sd card.

3.2.3 Photograph management

By pressing the change button "ESC" (Fig. 2.23) you change from live images to the list of stored photographs. In the list, you can select a required picture by pressing the appropriate arrow keys (Fig. 2.20); the selected picture has a yellow border. To display it press the "OK" input key (Fig. 2.20). By pressing "ESC" section

you can return to the list, press "ESC" again to return to the live image.

By pressing the "MENU" button (Fig. 2.22) while displaying the list, a menu bar appears, which you can control using the appropriate arrow keys (Fig. 2.20,). Here you can also change certain settings and bring them into force by pressing the "OK" input key (Fig. 2.20).

Menu overview in list display.

- File Protect, Lock, Unlock, Exit. Use the left arrow key to leave the selection screen.
- Del File – Current (delete chosen graphics file), All (delete all graphics files). This is queried for certainty reasons. If you decide yes use the left arrow key to go to OK and press OK. If not leave Cancel activated and press OK to return to the list.
- Video (list of film records, Video Player), Picture (list of photo records, Picture View). Video can be reached from the picture list and vice versa.
- Exit has the same effect as "ESC".

3.2.4 Revise settings

By pressing the "MENU" button (Fig. 2.22) while displaying the live image a menu bar appears, which you can control using the appropriate arrow keys (Fig. 2.20). Here you can also change settings and bring them into force by pressing the "OK" input key (Fig. 2.20).

Menu overview (during live image display):

- Mode (photography mode): Single, Auto (at intervals given in Setting), Setting (photo intervals in minutes and seconds, adjusted using arrow keys and OK). Start the photo session with „SNAP“; the countdown to the next photo is shown in the middle of the screen. End it after the next snap with ESC.
- Size (pictorial resolution, width x height): A selection of different resolutions are available.
- Effect (graphical effect): Normal (normal positive color image), Negative (negative image), Sepia (sepia shading), Black-White.
- Date Label of the stored snaps: Setting (time), Yes (label), None (no label).
If you're in Setting press OK. Use the up and down arrows to change the year shown by a yellow arrow. Use the right and left arrows to alter the month and day in "Date", the hours and minutes in "Time". Select the time set with OK - this will be acknowledged by brief display of "Success". The year, month and day of a picture is shown top left.
- DV Record (mode for filming).
- Exit (the menu).

3.2.5 Produce and administer film

In this mode resolution is shown top left outside the image during live picture display and the memory time available for film at bottom left. The electronic zoom factor (1.0 to 2.0) is shown bottom right. Start filming with SNAP (illustration 2.21); press this key again to end filming. During filming a camera symbol blinks at top left and the current filming time is shown at bottom left. Film image resolution is 320 x 240. In Effect the same pictorial effects as for photos are selectable. Use Capture to toggle between filming and photographing. Use Exit or ESC to get out of the menu and then ESC to revert to the live picture display. To view the stored films use ESC to get to the photo list and then MENU to get to the film list via Video (see section 3.2.3). Use the arrows to choose a film, select it and then play it endlessly with OK. During play use OK to toggle between Pause (||) and Play (). Use the left arrow to choose the previous film (|) and the right the next (). A strip showing a film playing bar graph, play duration and functions is briefly displayed here. This can also be shown using Snap if you want to know current status. Use ESC to end the play function. Delete films using MENU and DelFile as for photos (see section 3.2.3). You can view your films and manage them on any connected PC (see

6 b) using a suitable media programmer.

4. Viewed Object – condition and preparation

4.1 Condition

Transparent and non-transparent specimens can be examined with this microscope, which is a direct as well as transmitted light model. If opaque specimens are examined - such as small animals, plant parts, tissue, stone and so on - the light is reflected from the specimen through the lens and eyepiece, where it is magnified, to the eye (reflected light principle, switch position I). If opaque specimens are examined the light from below goes through the specimen, lens and eyepiece to the eye and is magnified en route (direct light principle, switch position II). Many small organisms of the water, plant parts and finest animal components have now from nature these transparent characteristic, other ones must be accordingly prepared. Is it that we make it by means of a pre-treatment or penetration with suitable materials (media) transparent or thus that we cut finest wafers off of them (hand cut, Microtome) and these then examine. With these methods will us the following part make familiar.

manufacturer of thin preparation cuts

Specimens should be sliced as thin as possible, as stated before. A little wax or paraffin is needed to achieve the best results. A candle can be used for the purpose. The wax is put in a bowl and heated over a flame. The specimen is then dipped several times in the liquid wax. The wax is finally allowed to harden.

Use a MicroCut (Fig 5.36) or knife/scalpel (carefully) to make very thin slices of the object in its wax casing. These slices are then laid on a glass slide and covered with another.

manufacturer of an own preparation

Put the object which shall be observed on a glass slide and give with a pipette (Fig. 5.34 B) a drop of distilled water on the object (Fig. 6).

Set a cover glass (in each well sorted hobby shop available) perpendicularly at the edge of the water drop, so that the water runs along the cover glass edge (Fig. 7). Lower now the cover glass slowly over the water drop.

Note:

The gum medium supplied (Fig 5.37 B) is used to make permanent slide cultures. Add it instead of distilled water. The gum medium hardens so that the specimen is permanently affixed to its slide.

5. Experiments

If you made yourself familiar with the microscope already, you can accomplish the following experiments and observe the results under your microscope.

5.1 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 magnification and use the preparation of the daily paper. The letters seen are broken out, because the newspaper is printed on raw, inferior paper. Letters of the magazines appear smoother and more complete. The picture of the daily paper consists of many small points, which appear somewhat dirty. The pixels (raster points) of the magazine appear sharply.

5.2 Textile fibers

Items and accessories:

1. Threads of different textiles: Cotton, line, wool, silk, Celanese, nylon etc..

2. Two needles

Each thread is put on a glass slide and frayed with the help of the two needles. The threads are dampened and covered with a cover glass. The microscope is adjusted to a low magnification. Cotton staples are of vegetable origin and look under the microscope like a flat, turned volume. The fibers are thicker and rounder at the edges than in the center. Cotton staples consist primary of long, collapsed tubes. Linen fibers are also vegetable origin; they are round and run in straight lines direction. The fibers shine like silk and exhibit countless swelling at the fiber pipe. Silk is animal origin and consists of solid fibers of smaller diameter contrary to the hollow vegetable fibers. Each fiber is smooth and even moderate and has the appearance of a small glass rod. Wool fibers are also animal origin; the surface consists of overlapping cases, which appear broken and wavy. If it is possible, compare wool fibers of different weaving mills. Consider thereby the different appearance of the fibers. Experts can determine from it the country of origin of wool. Celanese is like already the name says, artificially manufactured by a long chemical process. All fibers show hard, dark lines on the smooth, shining surface. The fibers ripple themselves/ crinkle after drying in the same condition. Observe the thing in common and differences.

5.3 Salt water prawns

Accessories:

1. Prawn eggs (Fig 5.37 D)
2. Sea salt (Fig 5.37 C)
3. Prawn breeding plant (Fig 5.35)
4. Yeast (Fig 5.37 A)

5.3.1 The lifecycle of the saltwater prawn

The saltwater prawn or *artimia salina* to scientists has an unusual and interesting lifecycle. The female's eggs are hatched without any male shrimp having to fertilize them. The resultant baby prawns are all female. Under unusual circumstances such as when a swamp is drained the eggs may produce male prawns. These males fertilize the female's eggs, resulting in a specific type of eggs. These are called winter eggs and have a thick shell as protection. They're pretty rugged and can survive the swamp or lake drying out causing the death of the entire prawn population for up to a decade in a form of hibernation. The eggs hatch once the right ambient conditions again obtain. The eggs supplied (Fig 5.37 D) are of this type.

5.3.2 Hatching of the salt water prawn

To hatch the prawn it is essential to first have a saline solution suited to the prawn's needs. Fill half a liter of rain- or fresh-water in a container. Let it stand for about thirty hours. As water evaporates over time it's a good idea to have a second container of such water left standing for thirty-six hours. Once it's stood for this length of time pour half of the sea salt supplied into one of the containers (Fig 5.37 C) and stir until it has dissolved. Then pour some of it into the prawn breeding plant (Fig 5.35). Add a few eggs and close the lid. Put it somewhere with plenty of light but not in the direct sun. The temperature should be approximately 25 C. The prawns will hatch in two or three days at this temperature. Should any water evaporate during this time replace it from the second container.

5.3.3 The saltwater prawn under the microscope

What comes out of the egg is known as a nauplius larva. Use the pipette (Fig 5.34 B) to put some of them on a slide for examination. They will move in the solution using their hair like limbs. Remove a few daily from the container for examination under the microscope. If you do so and save the pictures made with the Microocular you will then have a seamless record of the prawn's lifecycle. You can remove the upper lid of the prawn breeding plant and put the whole thing under the microscope. The larvae will mature in six to ten weeks depending on ambient temperature. You will soon have bred an entire generation of saltwater prawns that constantly reproduce.

5.3.4 Feeding your saltwater prawns

To keep them alive saltwater prawns must be fed occasionally. This must be done carefully as overfeeding causes the water to stagnate and poison the prawns. Feeding is best done with dry powdered yeast (Fig 5.37 A). Give them a little every other day. If the water darkens this signifies it is stagnating. If so remove the prawns and put them in a fresh saline solution.

Note:

Shrimp eggs and shrimps are not suitable for consumption!

6. Image output and storage (SD card required)

The LCD Micro has the option to display pictures and store them:

a) View the picture on the LCD screen (sections 1+2.2).

b) You can store your photographs on a suitable sd memory card (SD = Secure Digital). The memory card slot of the LCD Micro is on the left hand side of the screen module (Fig. 1+2.1) above the USB connection. To use, push the memory card, with the contacts at the front, into the slot, until they engage with a faint click. If the installation is correct, a blue memory card symbol appears above on the LCD monitor. This is again released by pressing and releasing the memory card, which after a faint click, can be taken out of the slot. Your photographs are now transportable.

c) If you connect your microscope to the PC using the USB cable provided (Fig. 5.32), you can transfer the photographs to the PC. The SD-Memory card has to be plugged in. The USB connection of the LCD Micro is on the left side of the screen module (Fig. 1+2.1) under the memory card slot. Put the smaller B- plug (Micro) into the socket on the microscope and the larger A plug (PC) into a free USB port in your computer (Fig. 5.32). After a successful USB connection, the operating system will recognize new hardware and then a new drive will be initialized. This drive is marked as "removable data carrier e" or "removable data carrier f:", the letters vary depending upon the number of drive assemblies in your computer. They are made available on the work station, as well as in Windows Explorer. This drive contains the contents of your sd-memory card.

Note:

1. The "Access SD card error!" after removing the card is to be acknowledged by pressing OK.
2. If the card contains a lot of data the microscope module may be very slow or not react (Crash). Please then remove the card, turn the power to the microscope off, wait a bit and then start again.
3. If you delete a lot of data using DelFile / All this may not work first time round. If so simply repeat it until it does.

Caution:

When taking a photograph, no USB connection between PC and microscope may exist. Before you interrupt the USB connection or switch the screen module off, you must „deactivate“ the sd-card drive with the help of the hardware assistant (removable data carrier) ! If the drive is not deactivated, the PC might "crash" or there might even be a loss of data!

Note:

We recommend the use of SD-memory cards (Secure Digital) with 1 GB or up to 8 GB of storage capacity.

7. Care and maintenance

The microscope is a high quality optical appliance. Therefore you should make sure that dust or moisture do not come into contact with your microscope. Avoid putting fingerprints on any optical surfaces. If dust or dirt should nevertheless have gotten onto your microscope, or the accessories, you should first remove this with a soft brush. Then clean the soiled area with a soft, lint-free cloth. To remove fingerprints from the optical surfaces it is best to use a lint-free, soft cloth, to

which you have applied some alcohol.

After usage, you should stow the microscope and the accessories in their correct containers again.

Remember:

A well maintained microscope will keep its optical quality for years and thus maintain its value.

8. Elimination of errors

Error

Solution

No picture seen

switch on Light
switch on LCD monitor
re-set the focus

Screen module crash
(photo storage ceased,
no input reactions, switch off
impossible)

Remove card and mains plug, wait
reinsert it and then turn the LCD
screen on.

Memory card does not function
(512 MB and higher)

Use a memory card with smaller
capacity

9. Technical data

System requirements for USB connection/memory card use:

Windows operating system

Main board with USB connection

Media program (e.g. image processing program, program for playing films)

SD Memory card (not included) up to 32 GB max. (8 GB card recommended).

SD Memory card reader

Your dealer: _____

Name: _____

Postcode/City: _____

Street: _____

Telephone: _____

Date of purchase: _____

Signature: _____



© 2017 National Geographic Partners LLC.
All rights reserved. NATIONAL GEOGRAPHIC
and Yellow Border Design are trademarks of the
National Geographic Society, used under license.

© 2017 Explore Scientific®, LLC.
1010 S 48th St. Springdale, AR 72756
exploreone.com | 866.252.3811
All rights reserved. Made in China.

CONFORMS TO THE SAFETY
REQUIREMENTS OF ASTM F963