THE MICROSCOPE WORKSTATION AND THE ADJUSTMENT OF THE MICROSCOPE

The SCOPE SATELLITE bench

The SCOPE MASTER bench

The OLYMPUS SD30

The LORIN SCOPE SZM Stereo Zoom microscope
1) The concept of the microscope work station

The microscope workstation is a table where the microscope and the work holding equipment is fixed on the table top, because the clear vision to the work piece is defined over a working distance (WD) which is also fixed.

a) The microscope – table top – work holding - unit

So one can see the microscope, the table top and the work holding as one unit. See the ill. Below:

The WD is different from different microscope types. In the above example it is an OLYMPUS SD30 with a natural WD of 110 mm which can be enhanced to 130 mm with a 0.75x pre-lense and even to 190 mm with a 0.50x pre-lense. This however happens at the cost of spherical wide angle distortion.
b) **The operator – chair – ground - unit**

The operator (worker), sitting on the chair, which is planted to the ground can be seen as the other unit. See ill. below.
c) The complete microscope – stone setter – table unit

Now it is necessary to match the eye levels of the “microscope-table top-work holding unit” (MTWU) and the “operator-chair-ground unit” (OCGU). This is only possible by mounting the MTWU on a height adjustable table construction which is able to move easy but shall not shake in order to enable a precise microscope work. See ill. Below:
d) The height adjustable table construction

The most important point in the height adjustable table construction is that the table will never shake nor be loose, because any vibration etc. can be transferred to the microscope and then the picture will never be clear.

We have 3 different systems for that:

- **Height adjustment with electro motors**
- **Height adjustment by hydraulic operation**
- **Height adjustment with snap lock system**
2) The sitting position

More than in any other work requires the working on the microscope a correct sitting position. The work with the microscope takes the full concentration and a bad sitting position would disturb this concentration. It is important to sit in front of the microscope with a straight back and the chair height has to be so that the legs are in right angle to the laps and the feet touch the the ground.

These are the steps for proper seating position:

- **First adjust the chair height and then bring the table up or down to finally have the eyepieces of the microscope in eye level position with a straight, but relaxed back.**

- **The worker likes an ergonomic head tilt of app. 30°. That is why the microscope head which has a natural viewing in angle of 45° has also to be tilted by 15° to bring the viewing in angle to the same amount (45°-15° = 30°).**
One frequently asked question (FAQ) regarding the sitting position is always: *Why is a height adjustable table necessary, when only the chair can be brought up or down?*

**Answer:**
*Because the individual height difference of individual people in the sitting position can be more than 15 cm! Even when some people have almost the same body height when standing, the height difference measured from seat to eye level in sitting position can be much more. The chair height however should always be adjusted at a personal good level, then only a working day of 8 hours can be maintained without long term health problems.*

**a) The correct table height adjustment**

The table height is then properly adjusted:

- when the eye level is at microscope level so that the eyes can have a small distance to the eyepieces and looking through is relaxed and does not require to round the back or bow the head too much.
- when the right arm rests relaxed on the table top
- when the back is straight but relaxed

![Diagram of correct table height adjustment](image)
b) The focal length adjustment of the microscope

When adjusting the focal length of the microscope one has to take into account the individual natural focal length difference of the people.

Either this natural focal length difference is already corrected by wearing specticals, and in that case it is recommended to look through the microscope with the specs on.

However, if the natural focal length difference is not corrected by specs one has to adjust the focal length by the following procedure:

Step 1:
Adjust the left, adjustable eyepiece of your microscope to 0 - position (see picture)

Step 2:
Adjust both eyepieces to perfect eye distance until both eyes can look properly through the eyepieces and can see one image only - the black shadows and double images are eliminated. At this stage the picture may not yet be sharp due to improper focal length adjustment, but the image must be at least one.
Step 3:

Pre-adjust the focal length using the main focal length adjustment wheel and looking with both eyes. At this stage the picture must be as sharp as possible. If necessary step 2 (eye distance adjustment) must be repeated.

Step 4:

Close the left eye (at this side the eyepiece is adjustable, but it will remain at the 0 – position) and adjust the focal length perfect as per the right eye’s impression using the main focal length adjustment wheel.
Step 5:

Close the right eye (at this side the eyepiece is not adjustable) and adjust the focal length at the left eyepiece which is adjustable. At this stage the picture must come most clear and the 3D vision must fully appear.

The microscope is now ready for use and further focal length adjustments due to changing the work piece position will be done only as per step 3.