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# Standard Procedure SP 0001:2005

## Methods for setting up and adjusting a light microscope

### 1 Scope

This Standard Procedure can be used to adjust the illumination (lighting), magnification and focus of a light microscope with two or more objectives, to give the best view of a specimen.

### 2 Definitions

Figure 1 illustrates the definitions relating to microscope parts.

*magnifying power or magnification*

the size of the image produced by a lens compared with the size of the original object

*total magnification*

the size of the image produced by the microscope compared with the size of the original object. It is equal to the magnifications of the objective and eyepiece multiplied together, (and also multiplied by the magnification of lenses, if any, in the tube between them)

*condenser*

a device that concentrates light from the mirror onto the specimen to improve illumination (necessary only when using higher magnifications)

*objective*

the lens nearest the object being viewed

*eyepiece*

the lens through which the user looks

*nosepiece*

a circular disc that can be rotated to change the objective

*focus*

the sharpness of the image. An 'in focus' image is as sharp and clear as possible. An 'out of focus' image is fuzzy and unclear.

### 3 Principle

The illumination, magnification and focus are adjusted in turn, to produce a sharp image of a pre-prepared specimen.

### 4 Apparatus

- microscope with two or more objectives
- pre-prepared specimen slide (e.g. microdot) (*Philip Harris 2004 catalogue pg743, item C5A76090*)
- light source (lamp or good daylight)

### 5 Procedure

Refer to figure 1 to identify microscope parts.

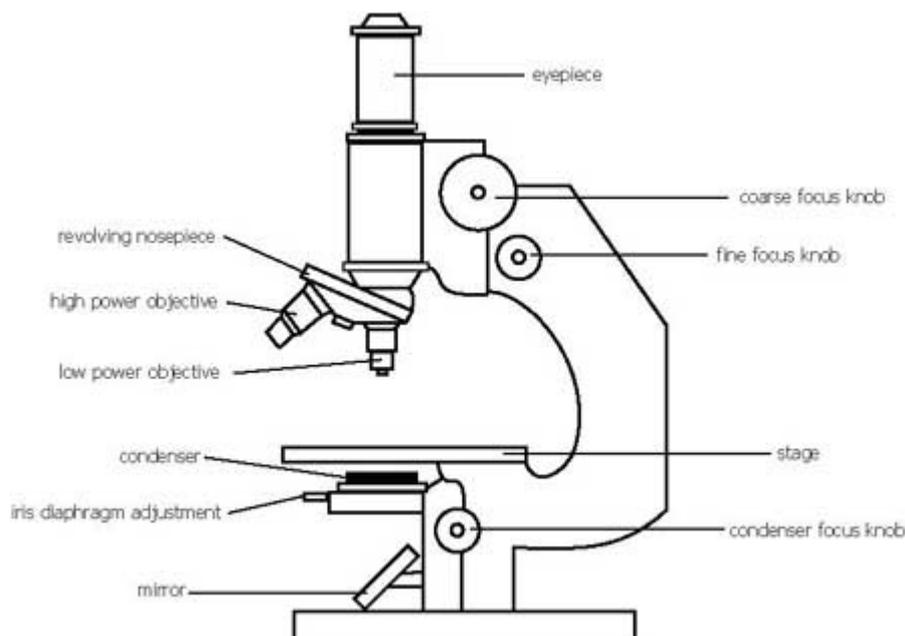


Figure 1:

NOTE: Depending on design, the focus knobs may raise and lower the lenses, as shown. Alternatively, they may be lower down and move the stage instead.

- Place the microscope near a good light source – a lamp, or a window that is **not** facing the sun. **Never** reflect direct sunlight into the microscope. It could damage your eye.
- While looking through the eyepiece, adjust the mirror to reflect light from the source up into the microscope. Adjust the diaphragm, and condenser if there is one, to give bright, even illumination.
- Rotate the nosepiece to select the lowest power objective. This is probably the one with a red band, but check the magnification marked on each lens.
- Using the coarse focus knob raise the objective (or lower the stage) to increase the gap between them.
- Place a prepared specimen slide on the stage, and clip it in position.
- While looking at the slide from the side, turn the coarse focus knob to bring the objective and stage closer together. Position the objective just above the surface of the slide. Note which way to turn the knob to decrease the gap.
- Now look through the eyepiece and slowly turn the coarse focus knob the **opposite** way, to increase the gap again. (Be careful not to turn the knob the wrong way, or you will crush the objective against the slide.) Continue until the specimen comes into focus.
- Slowly turn the fine focus knob to produce the sharpest image you can.  
The microscope is now set up. To view other parts of the specimen, carefully move the slide around on the stage.

The total magnification of the image can be calculated from the formula:

$$\text{Total magnification} = M_o \times M_e$$

Where

$M_o$  = magnifying power of the objective

$M_e$  = magnifying power of the eyepiece (probably x10)

NOTE: This assumes there are no additional lenses in the microscope tube.

To 'zoom in' to see greater detail:

- Move the slide to get the part you want to see in the centre of the image.
- Rotate the nosepiece to bring the next higher magnification objective into position.
- Use the fine focus knob to bring the image back into sharp focus.