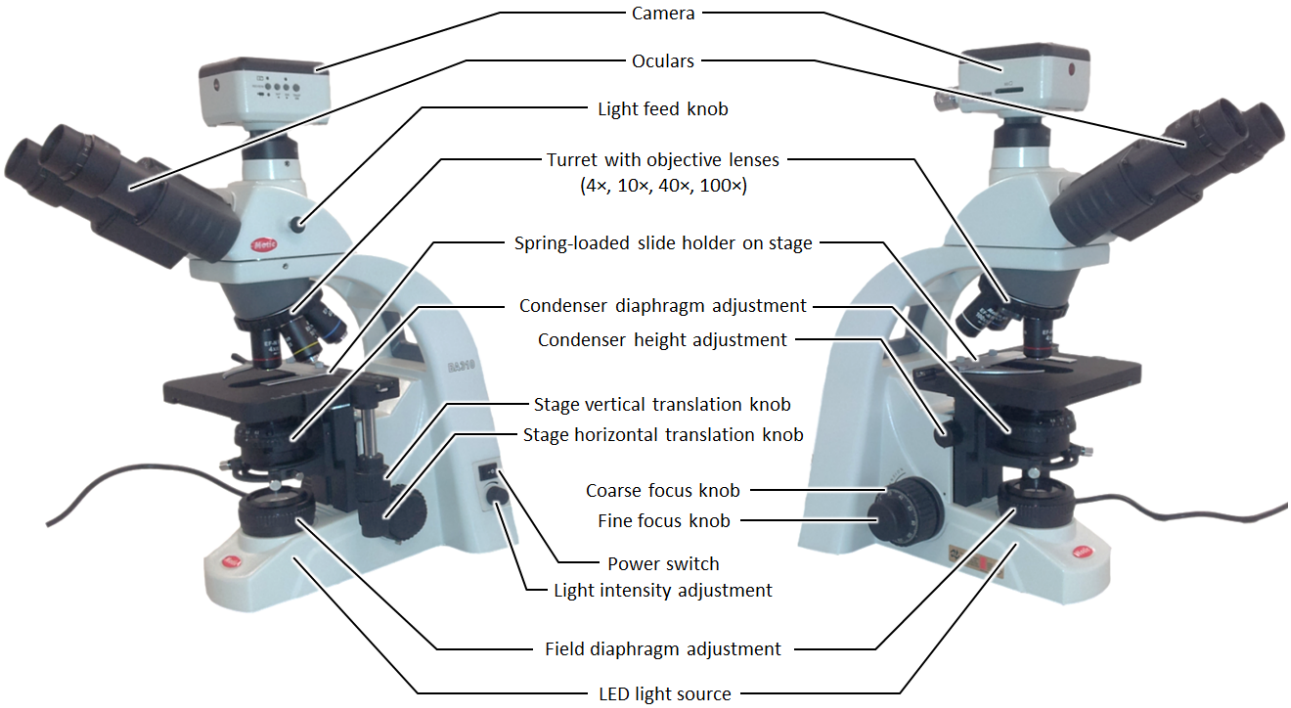
Motic binocular compound camera microscopes

To ensure that you can see cellular and sub-cellular structures and processes, it is really important to set up your microscope properly. We also ask you to do you utmost in looking after these devices. A microscope that is well looked after can last many decades!

Parts of the microscope checklist:

TOP	Eye-pieces (or oculars)	There are two eye-pieces (hence this is binocular microscope) and these can be adjusted to accommodate variation in inter-ocular distance and differences in focal capacity of an individual's left eye and right eye. The eye-pieces are 10x.
	Light feed knob	This is used when there is a camera in position.
	Turret head with objective	The turret head holds the objectives, it has a knurled ring so that objectives can be changed by simply turning this ring.
	Objectives: 4x, 10x, 40x, 100x	These are all par-focal so when your specimen is in focus with the 10x objective, when you change to the 40X or back to the 4x, the specimen should only require a small focal adjustment with the fine focus. *The 100x objective is an oil immersion lens*.
	Specimen stage	This is where you position your samples, *always* on a glass microscope slide and *always* with a cover slip. The slide is held in position with a spring-loaded clip. To scan a slide (in directions x and y) for interesting structures, use the controls associated with the stage (called here *translation knob*) located on the RHS of the 'scope.
	Course and fine focus	In the first instance, the course and fine focus allow you to get the specimen into focus. The fine focus is really important when scanning a specimen and controls the 'z' direction. Together with the *translation knob*, the fine focus allows you to use your two hands to integrate a specimen in 3 dimensions.
	Condenser and iris diaphragm	To ensure the best resolution, the amount of light passing from the condenser, through the specimen and into the objective needs to optimised. The height of the condenser can be adjusted using the condenser knob (located on the LHS – easily confused with the focus control). The diameter of the cone of light passing to the objective can be controlled and this diameter *must match size of the lens of each objective*. This is why this is adjusted every time the objective is changed.
	Light source and field iris diaphragm	The diameter of the cone of light passing to the condenser can be adjusted to *match size of the lens in the condenser,* taking into consideration the objective with the largest lens. This is why the field iris diaphragm only has to be set once at the start.
	Light intensity	The appropriate amount of light on these microscopes is only a very small (approx. 3 mm) from minimum.
	On switch	This switch turns the light on and off.

Setting up the microscope (Köhler illumination): To see a specimen using a microscope requires light of adequate intensity (light source) to be direct through a condenser, focused on a specimen (on the stage) and then the image magnified via the objectives (there are 4 of these) and viewed through the eye-pieces. There are a few adjustments to be aware of, so please read these notes carefully. To set up a microscope, we start at the bottom!

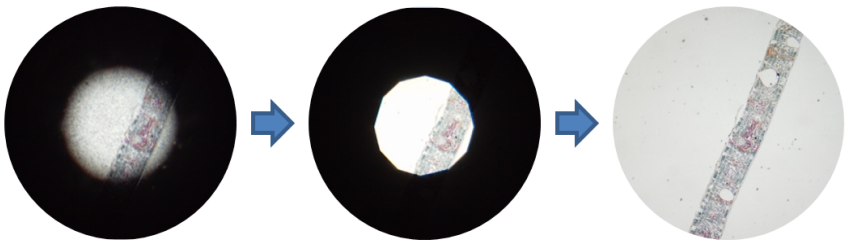


A. Adjusting the amount of light to the specimen to minimise light scatter

1. Start with the 4× objective (red) in place above the specimen stage.

Note: please return 4x objective to position at the end of your class.

2. Position a slide onto the stage using the spring-loaded slide holder.
3. Switch the microscope on and adjust the light intensity; turn the light only a little way – only about 3 mm from "just on'.
4. Looking through the eye-pieces, use the coarse and fine focus knobs to focus the specimen. Use both of your eyes to look at the specimen – adjust the distance and angle between the oculars if necessary. To move the slide, turn the translation controls.
5. While looking at your specimen, reduce the field iris diaphragm (knurled ring around the light source) so that you can see the edges of the iris diaphragm. Adjust the condenser height (LHS condenser knob) so that the edges become sharp. Expand the field diaphragm so that it extends just outside the field of view.



B. Matching the numeric apertures of the objective and the condenser

6. When you change between objectives, you will need to adjust the aperture of the condenser iris diaphragm. Once the specimen is focused, adjust the condenser iris diaphragm so that the numeric aperture matches that of the objective in use. The numeric aperture of each objective is next to the magnification and are as follows: 4 X = 0.10; 10 X = 0.25; 40 X = 0.65; 100 X = 1.25.

Again note: this adjustment needs to be made every time you switch to a different objective.

When you have finished with your microscope make sure it is clean, dry, you have removed your slides and the 4x objective is in place. Before you cover your microscope, get a demonstrator to check your microscope.