Basic Microscopy

Microscope Components

The microscope consists of three main sections: The head, the arm, and the base. Each section contains several important components of the microscope. The first section of the microscope is the head. The head contains the oculars and the nose piece, which hold the objective lens. The oculars are the eyepieces of the microscope. They contain lenses that have a magnification of 10X.

In most microscopes, they are binocular. You could adjust the eyepieces to match the distance between your eyes known as interpupillary distance so that you can see one image. It is important to look at the image under the microscope with both eyes because it improves the field of view. The objectives attached to the nose piece have a magnification of 10X which is low power, 20 and 40X which is high dry, and 100X which is oil immersion.

To determine the total magnification of an object you see in the ocular, you multiply the magnifying power of the objective lens, which is either 10X, 40X, or 100X by the magnification of the ocular lens, which is 10X. Right underneath the objectives is the stage. The stage, with its mechanical clips, hold the slide in place. In order to move the specimen in the field of view, you may need to move the stage right or left or backward or forward.

This is accomplished with the stage controls located under the stage. The stage control knobs are located on the side and beneath the stage. The stage must be kept clean and dry. For this reason, it is a good daily maintenance task to clean the stage as well as the objectives when you use a new slide.

The slide will drag on the stage if there's any oil or water on the stage. In the bright-field microscope, there are several components under the stage that are essential to obtaining a clear picture of the specimen on the slide. First is the condenser under the stage. It is known as the condenser diaphragm. The condenser diaphragm controls the light that illuminates the specimen passing through the objective to the oculars.

By opening and closing the condenser diaphragm, you control the angle of light, thereby controlling the contrast and depth of field. The second component under the stage, important for obtaining a clear image of the specimen, is the field diaphragm. This component is attached to the third major part of the microscope, the base. The leaves of the field diaphragm control the width of the light that reaches the condenser diaphragm.

Both the condenser and the field diaphragm are essential components to obtain proper illumination or Köhler illumination in your microscope. Köhler illumination will be discussed later in this module. There are two types of adjustment knobs on the microscope: coarse adjustment and fine adjustment. Both knobs are used to review a slide containing a specimen. The coarse adjustment knob, which is usually on the side of the microscope arm, is utilized to move the stage up and down to bring the specimen into focus.

The fine adjustment knob is inside the coarse adjustment knob and is manipulated to bring the object on the slide into sharper focus. This is usually performed under low power.