

Construction and function of optical microscope

A microscope is a device that enlarges objects that are too small to see with the naked eye. Magnification can be calculated by dividing the image size by the object size. There are 3 types of microscopes; the optical microscope, electron microscope and the scanning probe microscope.

Optical microscope

The optical microscope, also called the light microscope, uses a combination of light and lenses to magnify an image. Optical microscopes are used in the viewing of small objects such as cells. This type of microscope does not offer the highest magnification and so when viewing a cell has limited structures. For example in cells, organelles such as; lysosomes, the golgi apparatus, ribosomes and the cytoskeleton cannot be seen. The microscope cannot produce an image if the object has a smaller wavelength than light. Cell components are usually transparent and so have to be stained to enable us to see them. It has developed over the years to maximize resolution and clarity with enhancements in technology allowing for a more precise image. The two types of optical microscopes are the simple microscope, which uses a single lens, and a compound microscope, which uses many lenses.

Optical microscope components

The components of the microscope are as follows:

- **Eyepiece**

The lens at the top that you look through. It contains 2 or more lenses that focus the image. Usually has a 10x magnification.

- **Turret**

This holds 2 or more objective lenses and can be rotated easily to change magnification power. Normally when viewing a slide for example, it is best to start the magnification at the lowest and then work your way upwards.

- **Objective**

1 or more objective lens that collect light. The lenses are usually in a cylindrical shaped tube. The shortest lens has the lowest power i.e the lowest level of magnification, the longest one is the lens that has the greatest magnification power. The objective lenses usually have the magnification power 4x, 10x and 40x.

- **Focus wheel**

These are wheels that move the stage in the vertical plane. There are also wheels for adjusting coarse and focus. Some microscopes however, do allow focus at the eyepiece as well.

- **Frame**

The frame consists of the arm, the base and is in essence the bodywork of the microscope. It allows attachment of the focus wheels and the stage to the microscope.

- **Light source**

A light source used in place of a mirror. Most microscopes do allow manual light adjustment via a wheel located near the base.

- **Condenser**

The function of the condenser lens is to focus the light onto the specimen. To increase the quality the condenser lens may also have filters or a diaphragm.

- **Stage**

A platform underneath the objective that provides a platform for the slide to be viewed. In the center of the stage is a hole which allows light to pass through. The stage also normally has arms to hold the slide in place.

Applications

This type of microscopy is used in microelectronics, nano physics, biotechnology and microbiology. It has allowed us to distinguish between different cells and their components, and also paved the way for the other types of microscopes which have enhanced how we view the human body and also in the fight against disease.

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Bibliography

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