Before You Buy **Microscopes**

Microscope Type

Compound

- Most common type of microscope
- Use light transmitted through specimens for observation
- Typically used to view slide-mounted specimens
- Offer high-power magnification, a narrow field of view, and a short working distance

Inverted

- Special type of compound microscope
- Illuminate samples from above and below
- Can be used to view living cells or organisms in a petri dish or culture flask
- Allow you to observe specimens with minimal disturbance

Stereoscopic

- Magnify specimens using reflected light rather than transmitted
- Useful for large, thick specimens such as plants, rocks, collectables, and other similar items
- Provide a lower magnification, wider field of vision, and a longer working distance

Illumination

LED

- Provides a bright, white light, giving specimens a more natural appearance
- Most energy efficient form of illumination and quickly becoming the most popular
- Favored for portable and rechargeable microscopes
- Gives off less heat to help minimize the effect on the environment for living specimens

Halogen

- Provides a very bright, white light, giving specimens a natural appearance
- Gives off more heat than LED and is therefore not an ideal light source for living specimens
- Often used in high-end research microscopes

Tungsten

- One of the least expensive types of illumination
- Produces a yellowish light and a good amount of heat
- Can distort colors and the heat can be detrimental to living specimens

Features

Digital

- Standard microscope with a digital camera built into the head
- Have various outputs such as USB or HDMI that can connect to your computer or tablet
- Typically come with imaging software that allows you to capture images, generate video clips, and more

Traditional

- Non-digital microscope
- Can be converted to a digital microscope with the same suite of outputs and software options by purchasing an eyepiece camera

Stage Options

Fixed

- A pair of clips hold a slide in place
- Requires the user to push the sample around the stage manually

Mechanical

- Allows the stage to be moved along with the specimen
- Designed for a specific type of movement or observation
- Frequently used for point counting and patterned observation
- Gentler on the specimen than manually moving the sample

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Eyepieces

Monocular

- Single eye piece with one tube
- Most economical option, but also causes the most strain and discomfort to the user when used for long periods of time

Binocular

- Two eyepieces for more natural viewing
- Eyepieces are typically focused independently
- Most common and comfortable viewing configuration

Trinocular

- Binocular microscope with a third eye tube pointing upwards
- Third tube is designed for the introduction of a camera

Dual View

- Two monocular eyepieces placed at different angles
- Intended for two people to observe the same sample simultaneously

Condensers

Abbe

- Most common condenser
- Typically used for microscopes that focus at less than 400x
- Usually has controls to adjust both the distance and the diameter of the illuminating light

Aplanatic

- Corrects the beam of light for spherical aberration
- Prevents the light from focusing at slightly different points on the lens and reducing the sharpness of the image

Achromatic

- Corrects the beam of light for color aberration
- Prevents different colors from focusing at different points and causing the colors to bleed

Dark Field

- Blocks the unscattered light from the source
- Results in an image where the specimen is bright and the surrounding, empty space is dark

Phase Contrast

- Uses the light beam to show the differences in the refractive index
- Commonly used to study crystal structure

Optics

Field of View

A microscope will often distort the field of view based on the optics of the lens. There are three classes of optics based on the amount of distortion seen within the tube of the microscope. As a rule of thumb, lenses with a higher level of distortion will be less expensive.

Achro

- 60% of the field of view will be in focus
- Remaining edges will require refocusing

Semi-Plan

- 80% of the field of view will be in focus
- Remaining edges will require refocusing

Plan

- Entire field of view will be in focus
- Considered the best quality objectives

Focus Distance

Finite

- Traditional optical system with fixed mechanical tube length
- Lower light gathering ability and contrast than modern, infinity corrected optical systems, but is less expensive

Infinity

- More modern optical system
- Extends the mechanical tube length by creating parallel beams of light
- Used with different forms of light filtering and contrast such as illuminators and polarizers

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