Department of Anesthesia Techniques

THE MICROSCOPE

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- INTRODUCTION

Instrument that produces enlarged images of small objects, allowing the observer an exceedingly close view of minute structures at a scale convenient for examination and analysis.

The magnifying power of a microscope is an expression of the number of times the object being examined appears to be enlarged and is a dimensionless ratio.

- Total magnification = Objective magnification X ocular magnification.
- It is usually expressed in the form 10×.
- The resolution of a microscope is a measure of the smallest detail of the object that can be observed.
- Resolution is expressed in linear units, usually micrometres (μm).

Types of microscope

1. Optical Microscopes

- The most common type of microscope.
- These microscopes rely on lenses and light to illuminate a specimen for optimal image-gathering.

- They can be used for viewing living cells, insects, clinical blood and tissue assessment

2. Compound Microscopes

- A compound microscope uses a lens close to the object being viewed to collect light called the objective lens.

- They are most often used to view objects at a cellular level and can reach magnifications up to 1000x.

3. Electron Microscopes

- This type of microscope sends accelerated electrons across or through a specimen to render a digital image.

- Used to see detailed structure at the cellular and macromolecular levels.

4. Scanning Electron Microscopes (SEM)

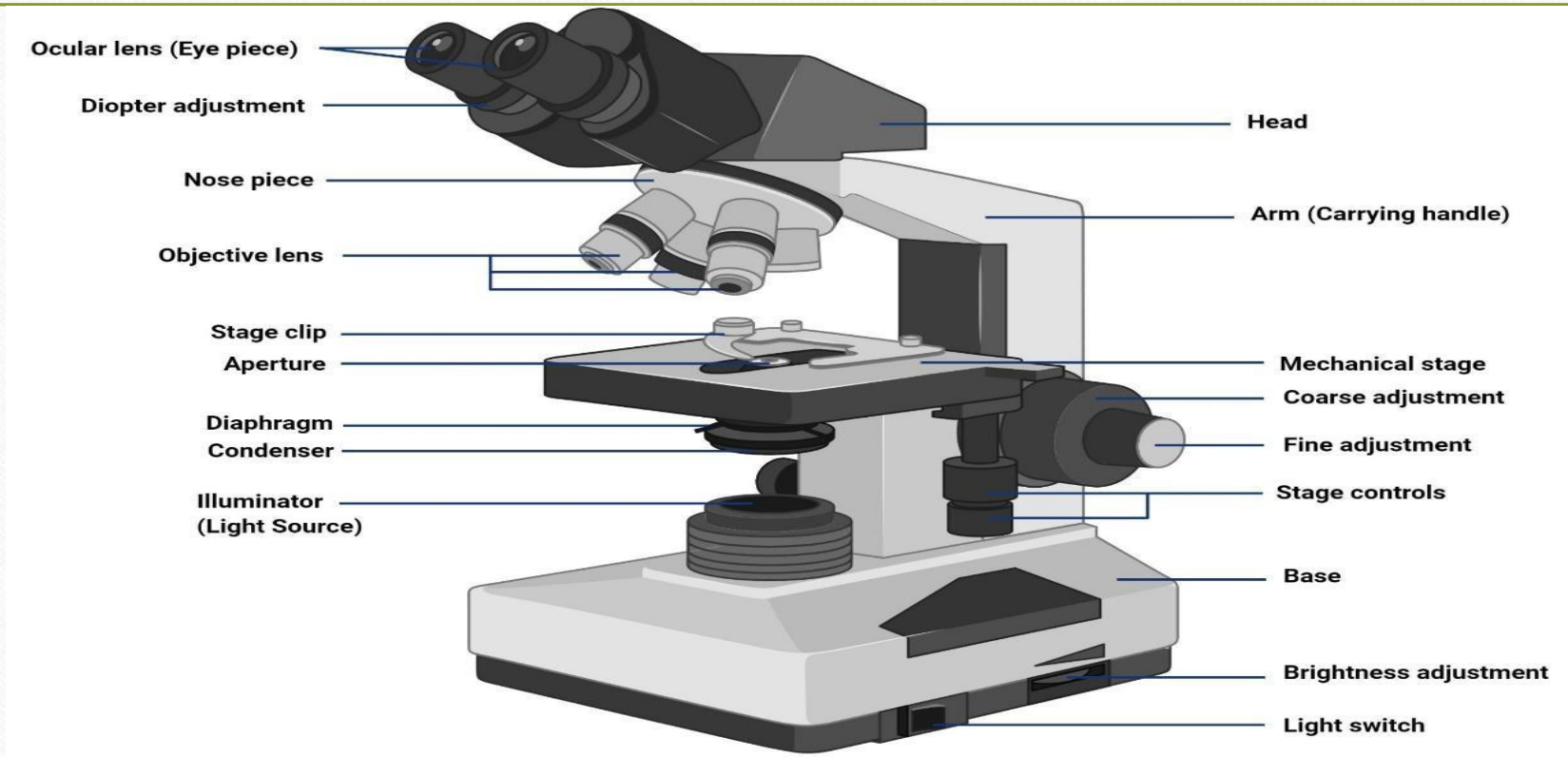
- SEM microscopes scan the surface of a specimen in a rectangular pattern to provide information about topography and composition.
- SEM also has a variety of applications. Industries including microelectronics, semiconductors, medical devices and food processing, all use scanning electron microscopy as a way to examine the surface composition of components and products.

5. Transmission Electron Microscopes (TEM)

- TEM must pass electrons through a thin specimen to receive information.

- This increased resolution allows us to study ultrastucture of organelles, viruses and macromolecules. Specially prepared materials samples may also be viewed in the TEM

Parts of the microscope



- **Eyepiece Lens:** the lens at the top that you look through. They are usually 10X or 15X power.
- **Tube**: Connects the eyepiece to the objective lenses
- **Arm**: Supports the tube and connects it to the base
- **Base**: The bottom of the microscope, used for support
- **Illuminator:** A steady light source used in place of a mirror.
- **Stage:** The flat platform where you place your slides. Stage clips hold the slides in place. If your microscope has a mechanical stage, you will be able to move the slide around by turning two knobs. One moves it left and right, the other moves it up and down.

- **Revolving Nosepiece or Turret**: This is the part that holds two or more objective lenses and can be rotated to easily change power.
- **Objective Lenses**: Usually you will find 3 or 4 objective lenses on a microscope. They almost always consist of 4X, 10X, 40X and 100X powers. When coupled with a 10X (most common) eyepiece lens, we get total magnifications of 40X (4X times 10X), 100X , 400X and 1000X. To have good resolution at 1000X, you will need a relatively sophisticated microscope with an Abbe condenser.
- **Condenser Lens**: The purpose of the condenser lens is to focus the light onto the specimen. Condenser lenses are most useful at the highest powers (400X and above).

How to Use a Microscope