

Biological Laboratory - Safety Rules and Recommendations

1st Lab

Safety Rules

- **Follow** your laboratory instructor's **directions**.
- **Wear** a **laboratory coats** whenever you are working with **chemicals** or **heated substances**.
- **Wear closed toed shoes** during labs to **protect** your legs and feet from **spills**.
- **Tie back long hair** to keep your hair away from any chemicals, burners and candles, or other laboratory equipment.

Safety Rules

- **Be alert** when you working in the laboratory and take extreme **care** **NOT** to **spill** any material in the laboratory. If spills occur, **ask** your teacher **immediately** about the proper cleanup procedure.
- **Never pour** chemicals or other substances into the **sink** or trash **container**.

Safety Rules

- **Never eat or taste** anything or **apply cosmetics** in the. This includes food, drinks, candy, and gum, as well as chemicals.
- **Wash** your **hands** with soap **before** and **after** performing every investigation. **Keep** your hands **away** from your **face**.

Safety Rules

- **Be familiar** with the **location** and proper **use of safety equipment** (**first aid kit, eyewash, gas shut-off, fire blanket, fire extinguisher**), and **exits**.
- **Notify** your teacher of any **medical problems** you may have, such as **allergies** or **asthma**.

Safety Rules

- **Keep** your laboratory area clean and free of unnecessary books, papers, and equipment.

Thoroughly **clean** your laboratory station **before** and **after** each activity.

- **Be sure** you **know** how to **use equipment** before beginning an experiment. If you are unsure - **ASK!**

Safety Rules

- **Mouth pipetting** or **drinking of solutions** is **strictly prohibited**
- **Broken glassware** or **sharp metal pieces** should be **placed** in “**sharps**” boxes (also **labeled “broken glass”**) unless it is **contaminated with body fluids or microorganisms.**

Safety Rules

- **Contaminated sharps** should be **placed** in an appropriate **labeled metal or glass container** for sterilizing.
- **Organic fluids** (e.g., **ether**, **acetone**, **chloroform**) or other **volatile** liquids should be **used inside a fume hood**.
- **Chemical wastes** should **never** be **placed** in a sink drain without permission. Please **consult** your instructor in all cases.

The Microscope

- A **microscope** (from the Ancient Greek "Micro" refers to **tiny**, "scope" refers to **view** or **look** at) is a tool used to **enlarge** small objects that are too small (**microscopic**) to be seen by the **naked** (unaided) **eye**.

Types of microscopes

Compound Light Microscope

- This is the **most common** type of microscope and uses **any kind of light** to view a specimen. It can **magnify** specimens up to **1500x**. It can also be referred to as a **biological** or **research** microscope. It uses **two** sets of **Lenses** to magnify an object.



Types of microscopes

Dissecting Microscope

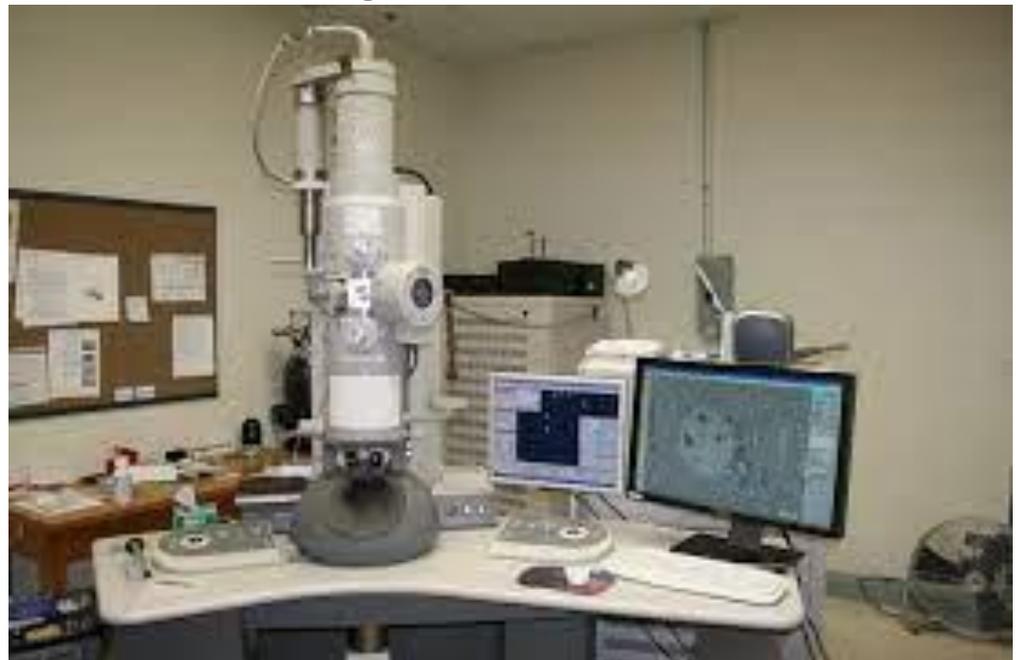
- It **magnifies** specimens from about **10x** to **80x**. It is used for examining **larger sized** items like insect parts, plant and flower parts.



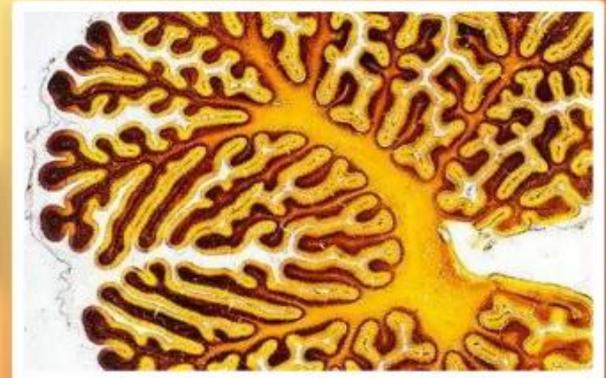
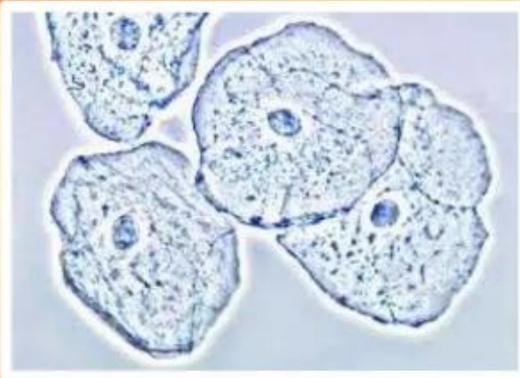
Types of microscopes

Electron Microscope

- It uses **beams** of **electrons** rather than **light** and can **magnifies** specimens up to **one million times**. It is used to observe **very small** objects: viruses, DNA, parts of cells.



Compound light microscope Parts



Parts and specifications of microscopes

- **(A) Eyepiece (ocular lens)** is the **top part** of the microscope; it is the **lens** you look through to see your specimen. The power of the eyepiece is usually **10X**.

- **Never touch the ocular lens with your fingers.**



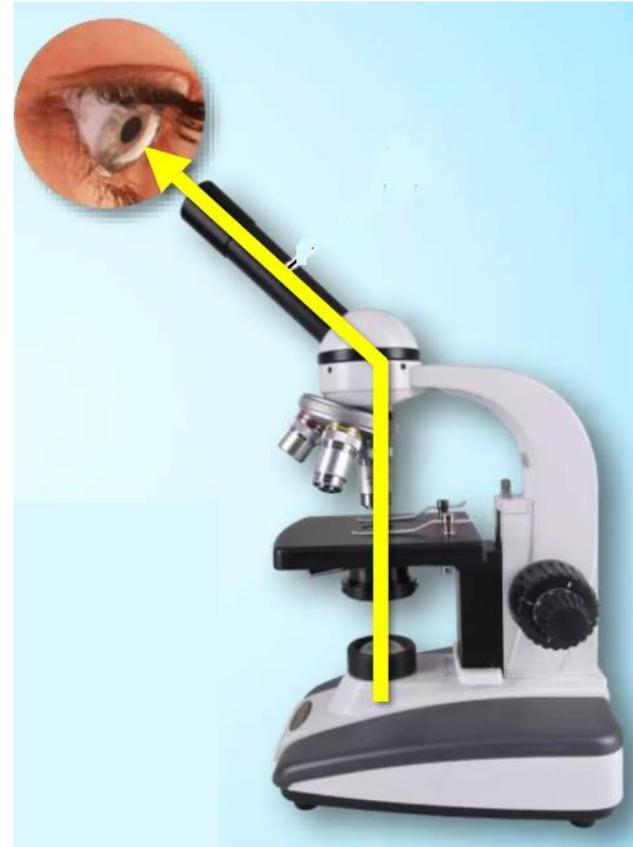
Parts and specifications of microscopes

- Eyepiece (ocular lens)



Parts and specifications of microscopes

- **(B) Body tube (eyepiece tube):** Holds the eyepiece lens and objective lens at the correct distance for magnification.



Parts and specifications of microscopes

- **(C) Arm:** It's the large **metal band**. It **connects** the **body tube** to the **base**.
- **When you carry a microscope, use one hand to hold the Arm, and the place the other under the base.**



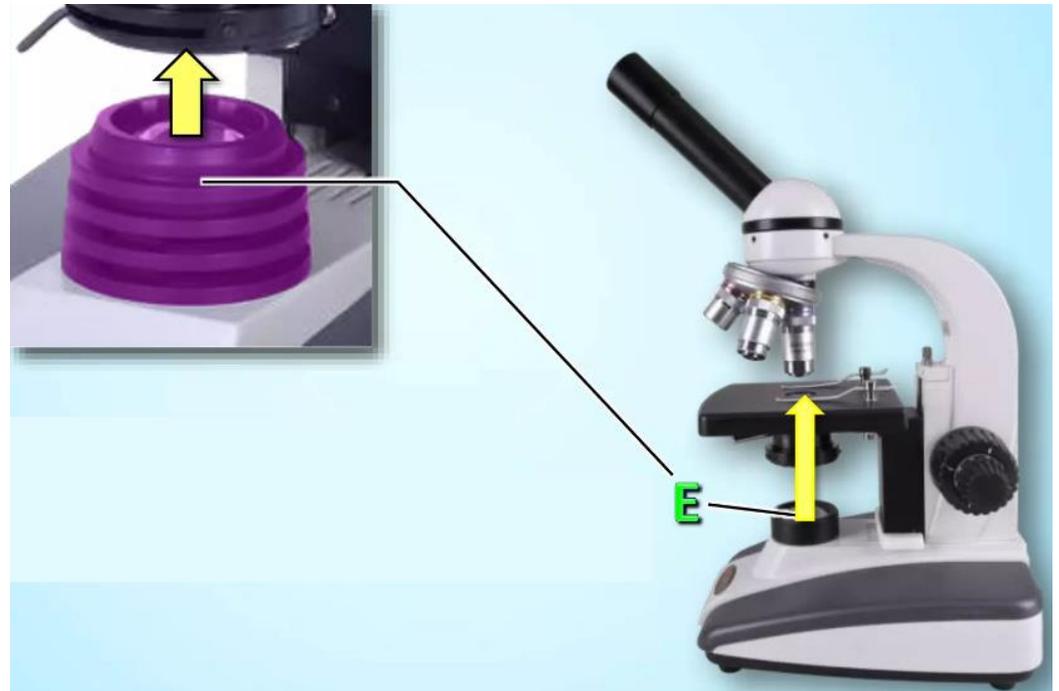
Parts and specifications of microscopes

- (D) Base:
- Lower most part of the microscope; provides a firm and steady support.
- It contains electronics and light source.



Parts and specifications of microscopes

- (E) Light source / Illuminator
- It can be a **lamp** or a **mirror**, and is usually found near the base of the microscope and provides the light needed to view the specimen.



Parts and specifications of microscopes

- (F) Revolving Nosepiece:
- The objective lenses are attached to it.
- Rotating nosepiece allows you to switch between different objective lenses.



Parts and specifications of microscopes

- **(G) Objective lenses:** Most microscopes have **three** or **four** lenses that magnify at different powers.
- Always start with the **lowest power** and work your way up to the **strongest** when examining a specimen. The **shortest lens** is usually the **lowest power**. The objectives include the **scanning lens (4X)**, **lower power lens (10X)**, **high power lens (40X)**, and the **oil immersion lens (100X)** in some microscopes.

Objective lenses

Low (scanning) 4 X

Medium 10 X

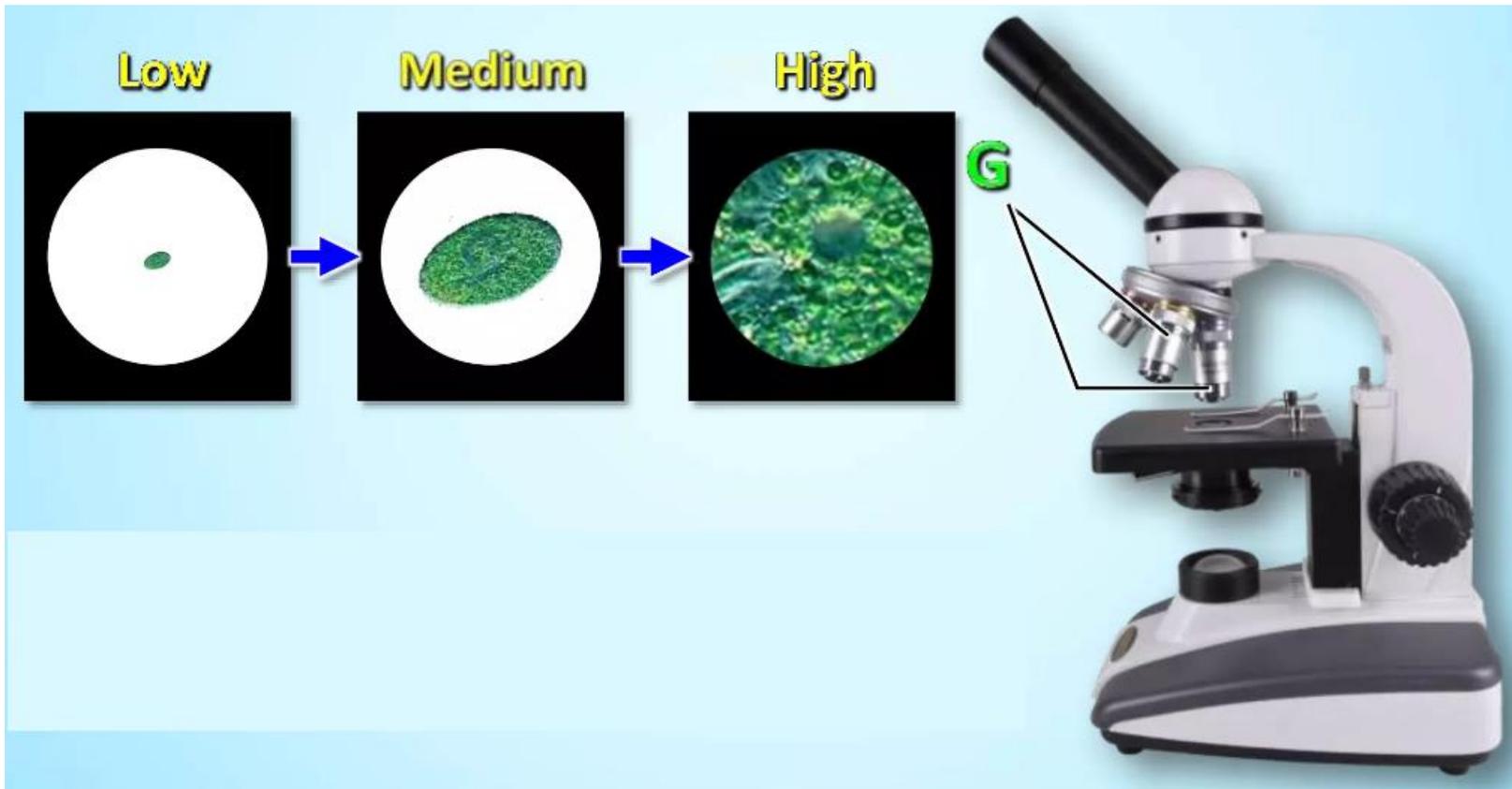
High 40 X

G



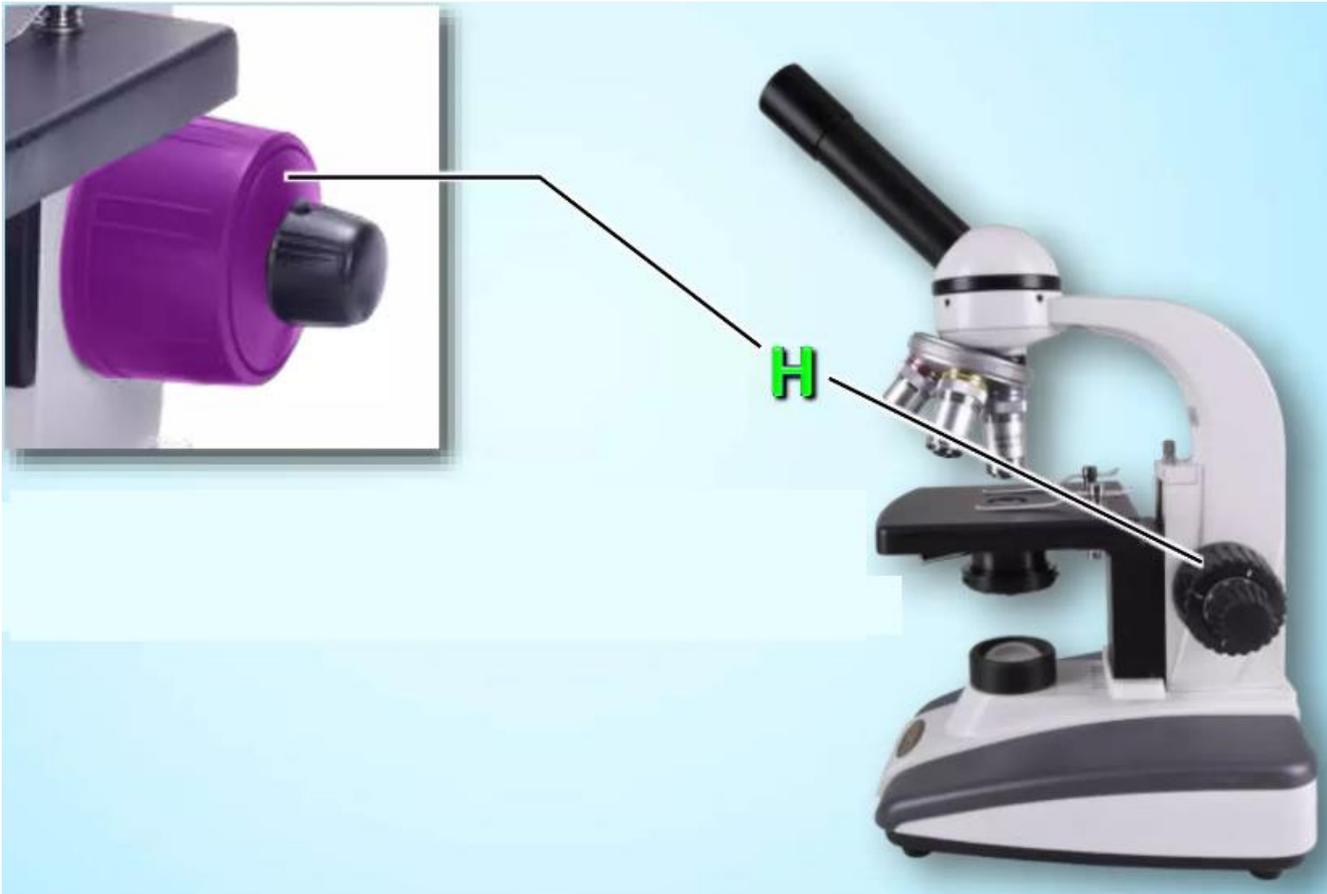
Objective lenses

- As the **power increased**, the **magnification becomes larger**, but the field of the view (**visible area**) becomes **smaller**.



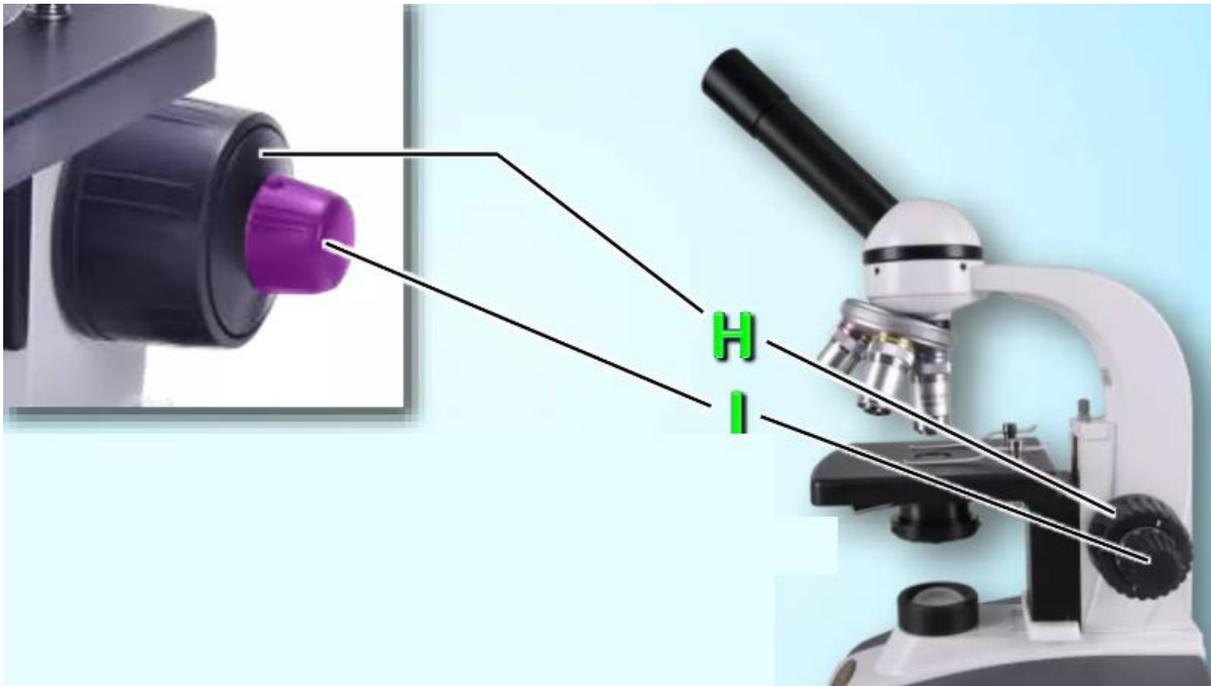
Parts and specifications of microscopes

- (H) Coarse Adjustment Knob: It is the **largest** knob. It is used to **focus** on the specimen at **low power** (**NEVER** use it at **high power**).



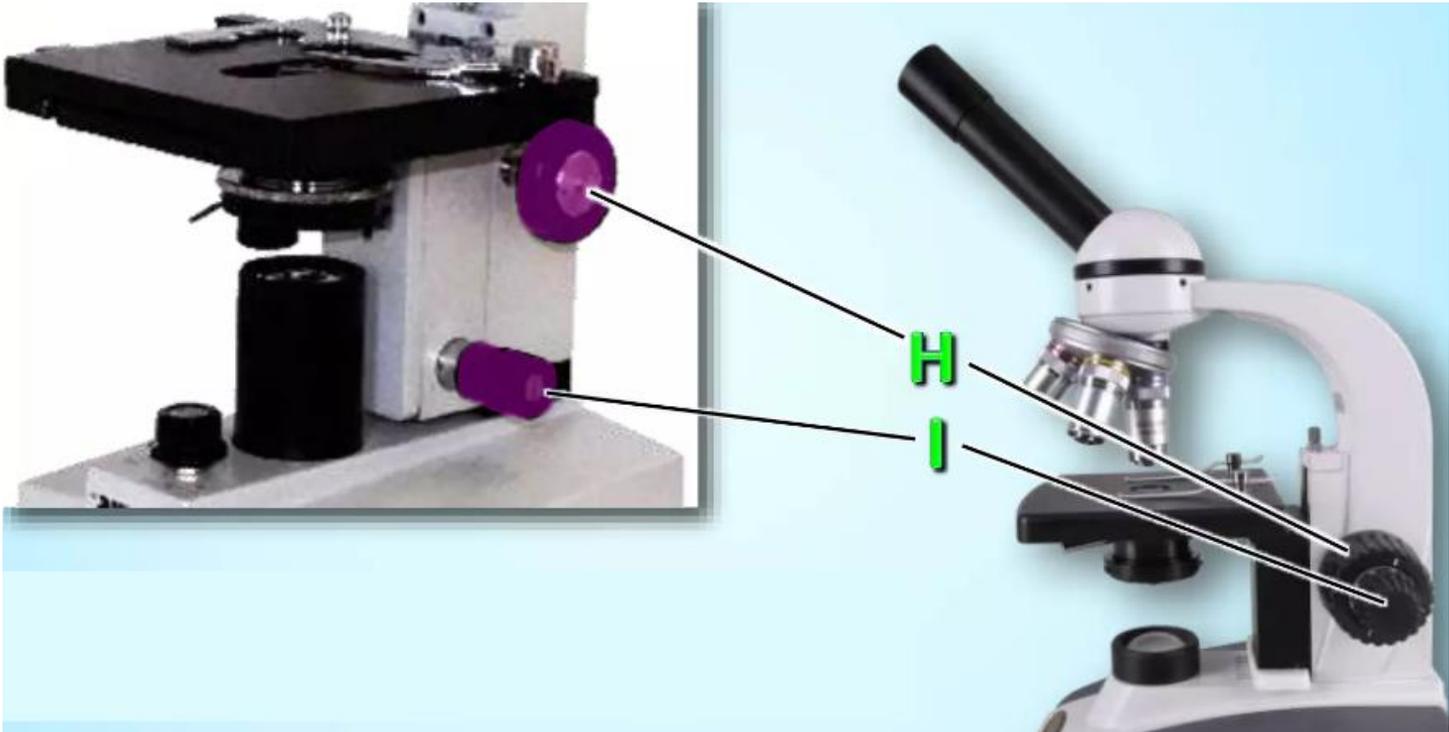
Parts and specifications of microscopes

- **(I) Fine Adjustment Knob:** It's the **smaller** round knob on the side of the microscope used under **high power** for extra **focusing**.
- Both knobs move the **stage up** and **down motion** to **help** put the specimen in **focus**.



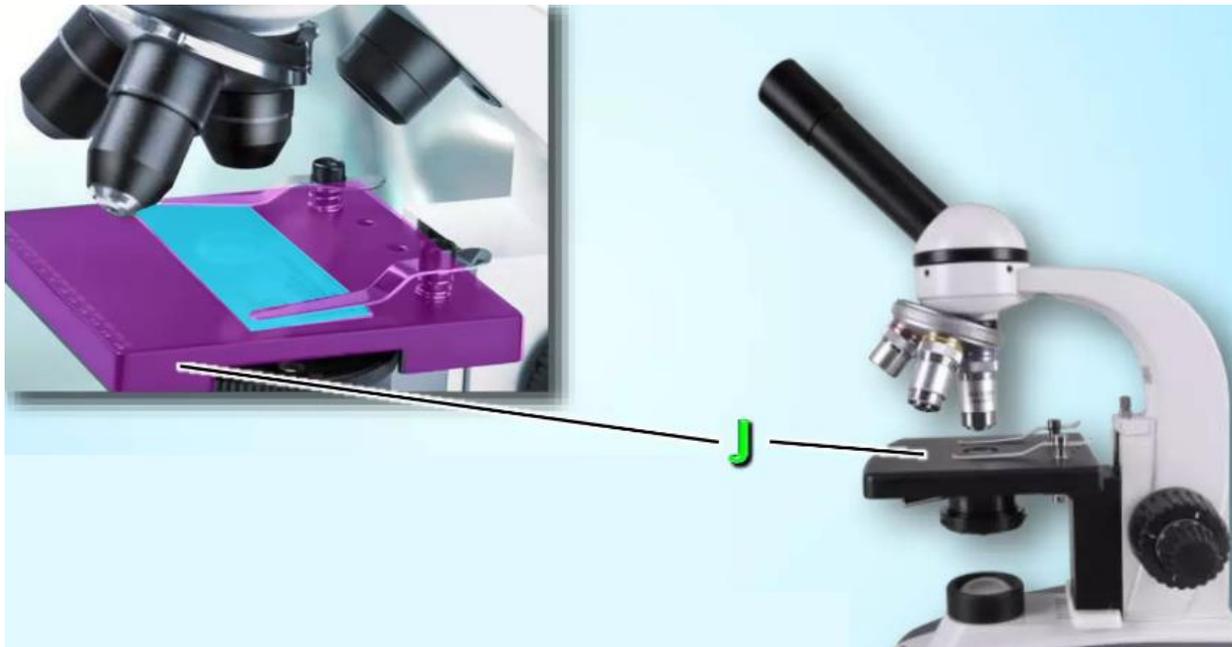
Parts and specifications of microscopes

- **Some** microscopes have **two knobs** located one on top of the other.
- The **smaller** one on the **bottom** is always the **fine adjustment knob**.



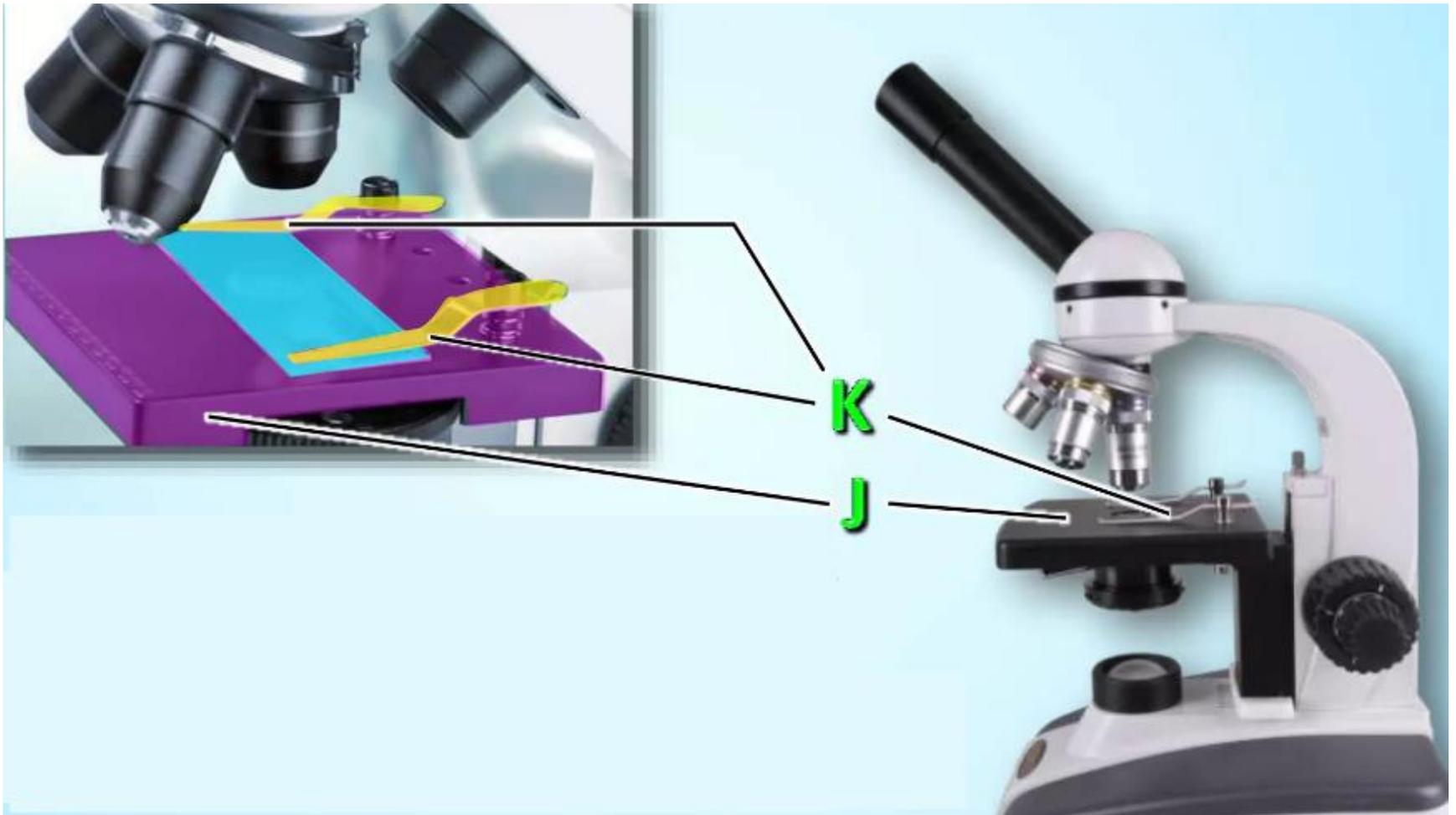
Parts and specifications of microscopes

- **(J) Stage:** It's where the **slide** which contains **specimen** is **placed** for **examination**.
- It contains a **hole** (called **Aperture**) which allows **light** to **pass through** the stage and into the specimen.



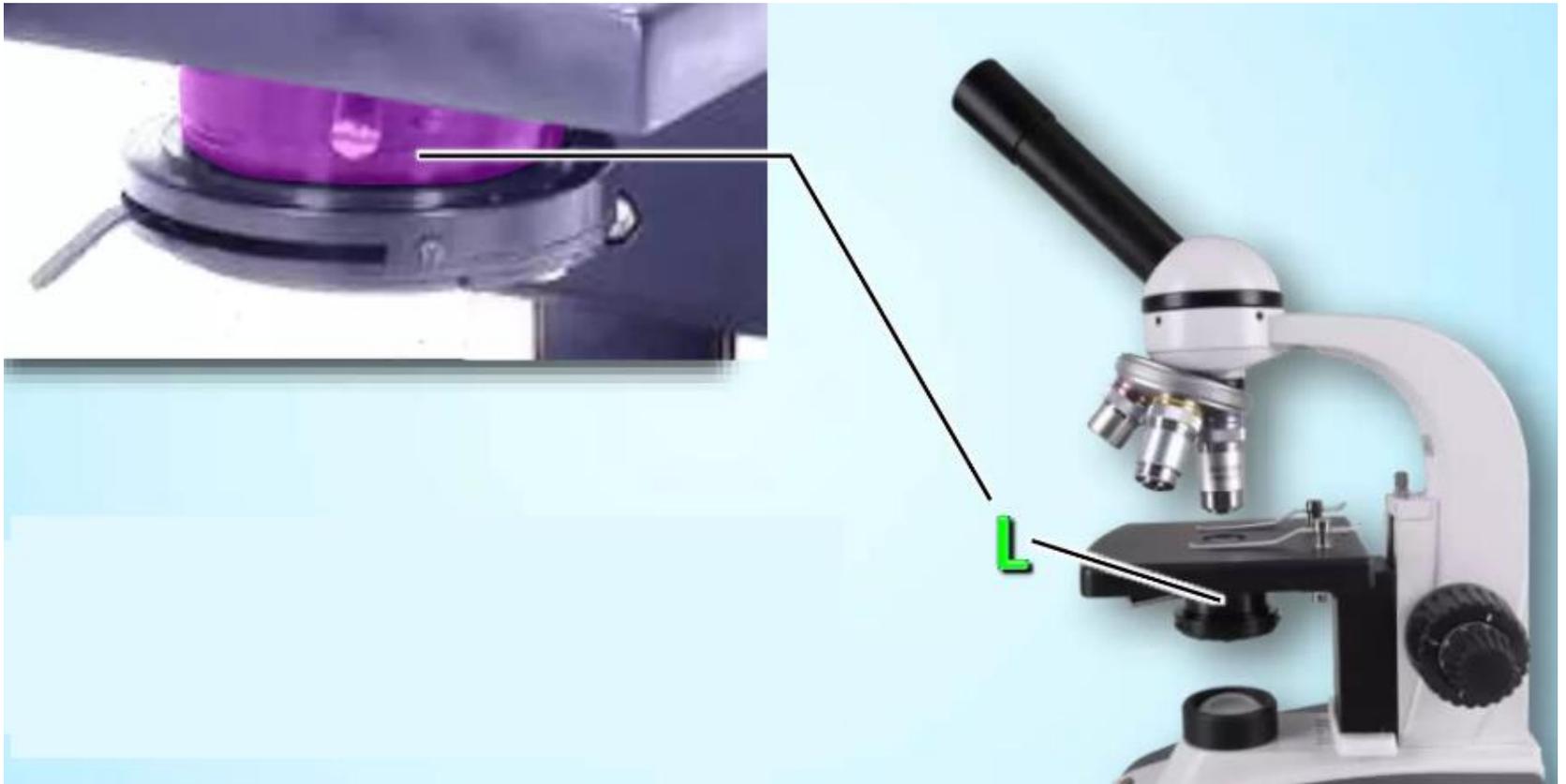
Parts and specifications of microscopes

- **(K) Stage clip:** It secures the slide on the stage.



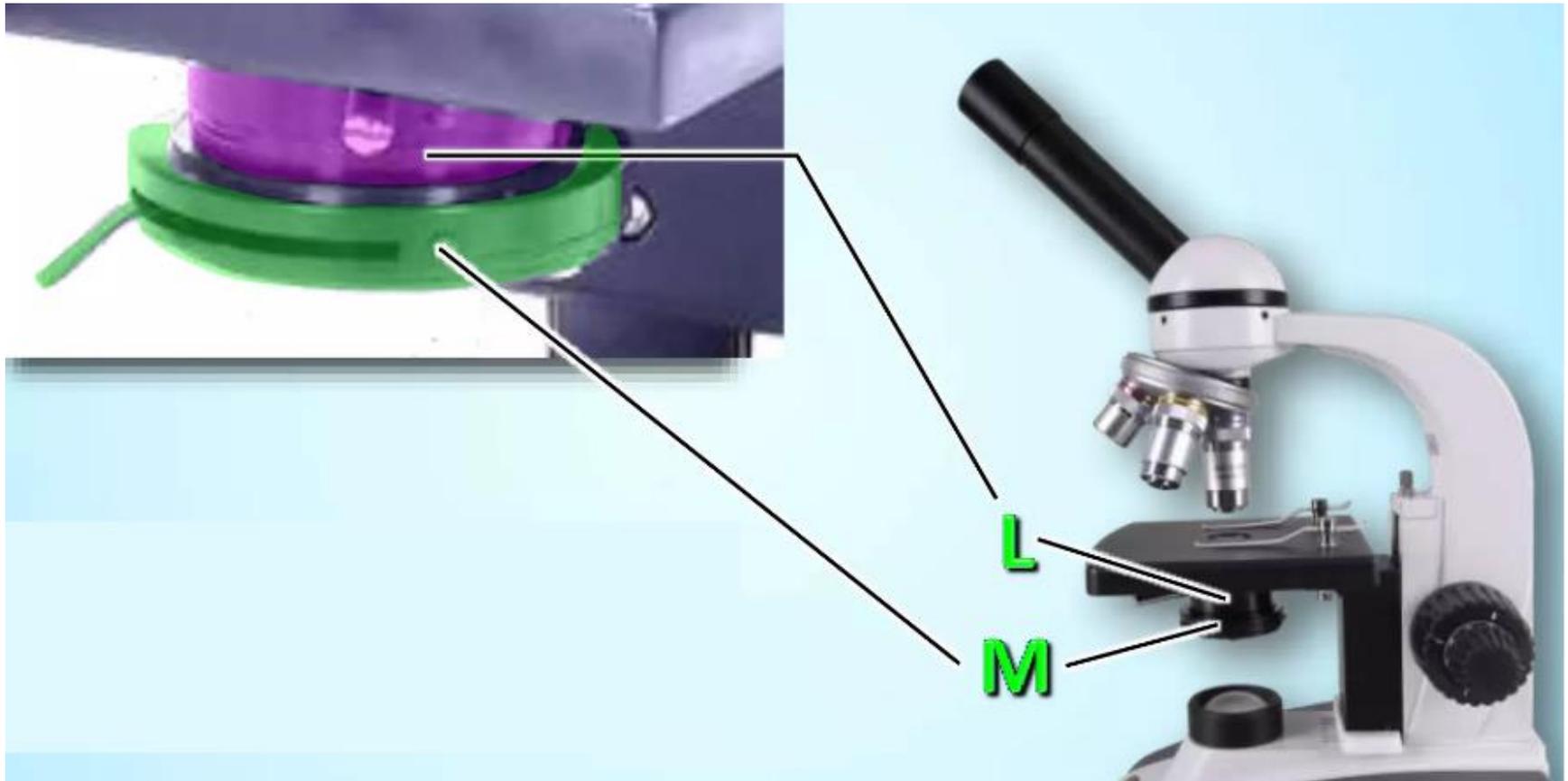
Parts and specifications of microscopes

- **(L) Condenser lens:** It is the **lens** under the **stage** that **focuses** light through **illuminator** through to the **hole** in the stage.



Parts and specifications of microscopes

- **(M) Diaphragm:** It contains a **dial** that **rotates to control** the **amount of light** that reaches the specimen (through **aperture**).



Calculation

- To calculate the **power of magnification**, **multiply** the **power of the ocular lens** by the **power of the objective lens**.
- **For example:**
- if ocular lens is **10x** and objective is **40x**

Therefore:

- **Power of magnification = 10 X 40 = 400x**

Compound light microscope

