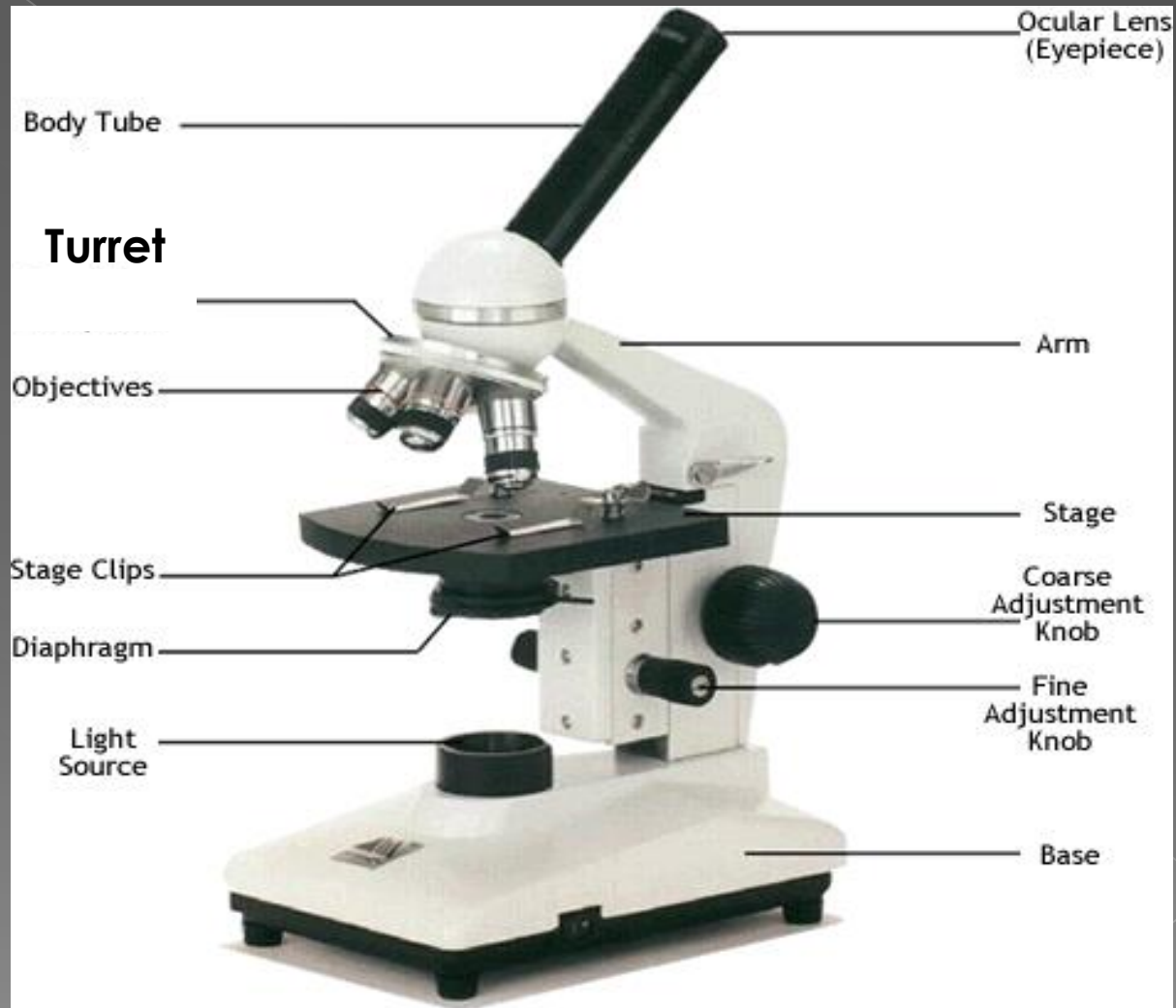


Review of Microscopy

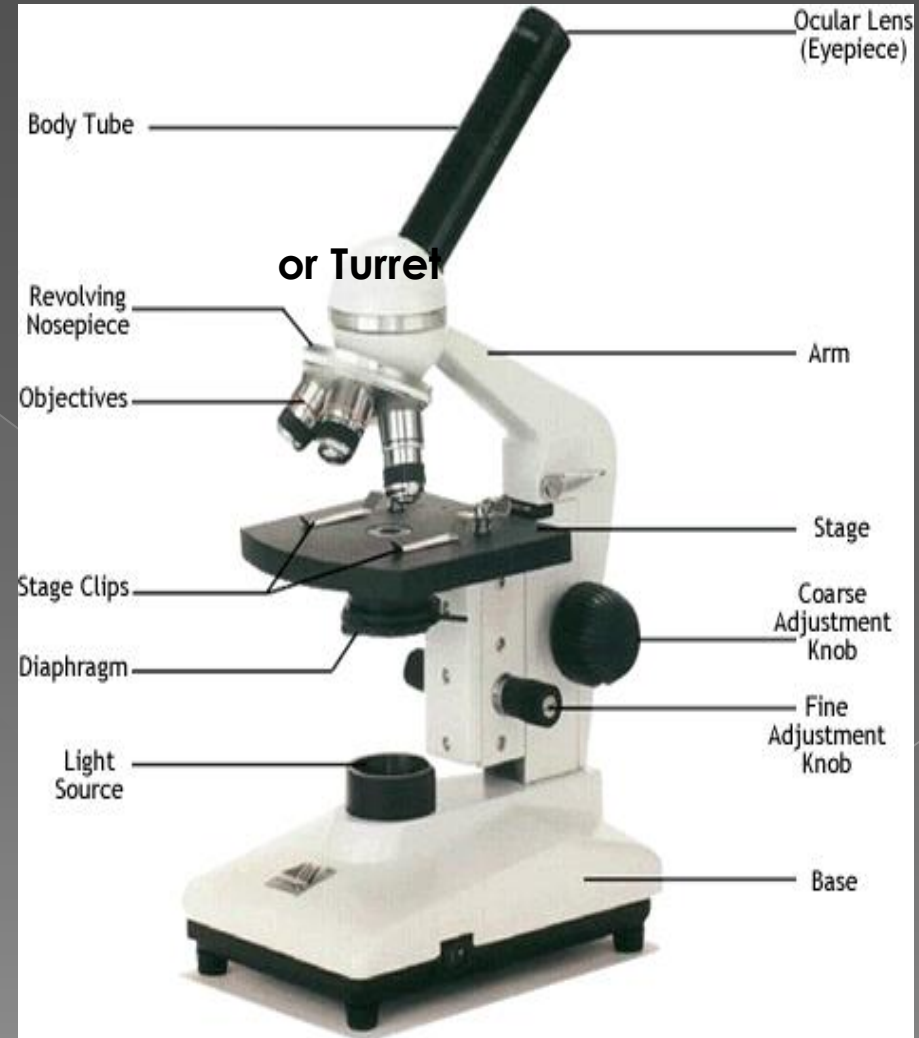


Magnification:

Ocular (Eyepiece): 10X

Objectives:

- Low Power: 4X
- Medium Power: 10X
- High Power: 40X
- Highest Power: 100X

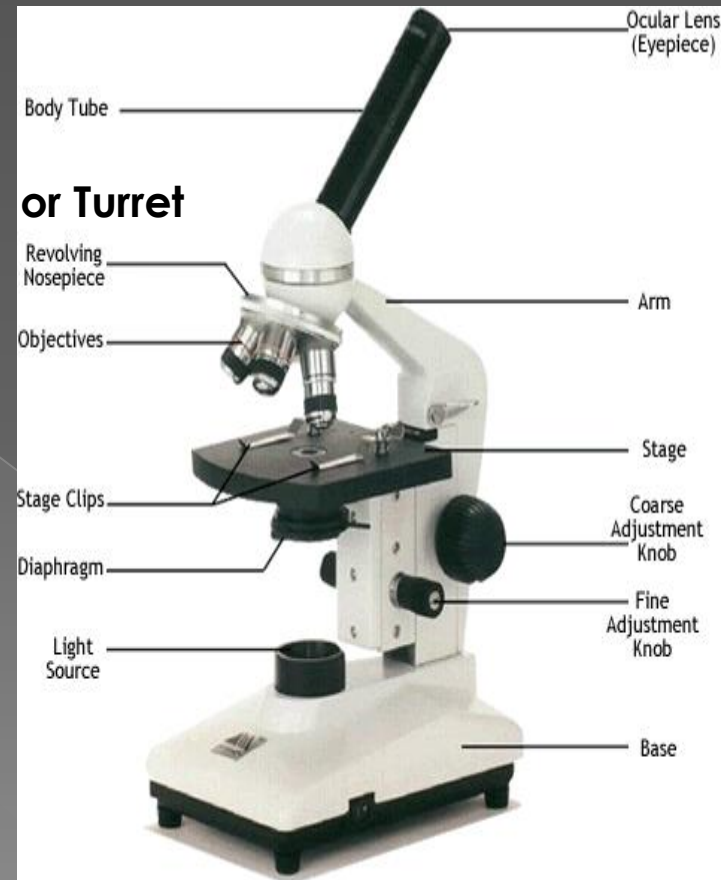


How to Calculate Magnification

Total Magnification = Ocular X Objective

- Low Power:
 - $10 \times 4 = 40X$ total mag
- Medium Power:
 - $10 \times 10 = 100X$ total mag
- High Power:
 - $10 \times 40 = 400X$ total mag
- Highest Power:
 - $10 \times 100 = 1000X$ total mag

○ **DO NOT ADD!!!!**



Steps for Using the Microscope:

1. Plug in and turn on light source.
1. Clean lenses with lens paper.
1. Put the slide on stage.
 - Hook under only ONE stage clip for ease in movement and control!

Steps for Using the Microscope:

4. On low power, FIND your specimen using the COARSE ADJUSTMENT KNOB.
5. Use Fine Adjustment Knob to refine the focus.
6. Switch to medium power and bring into focus using both knobs.
 - **Make sure your specimen is in the center so as to NOT lose it when you switch to high power**

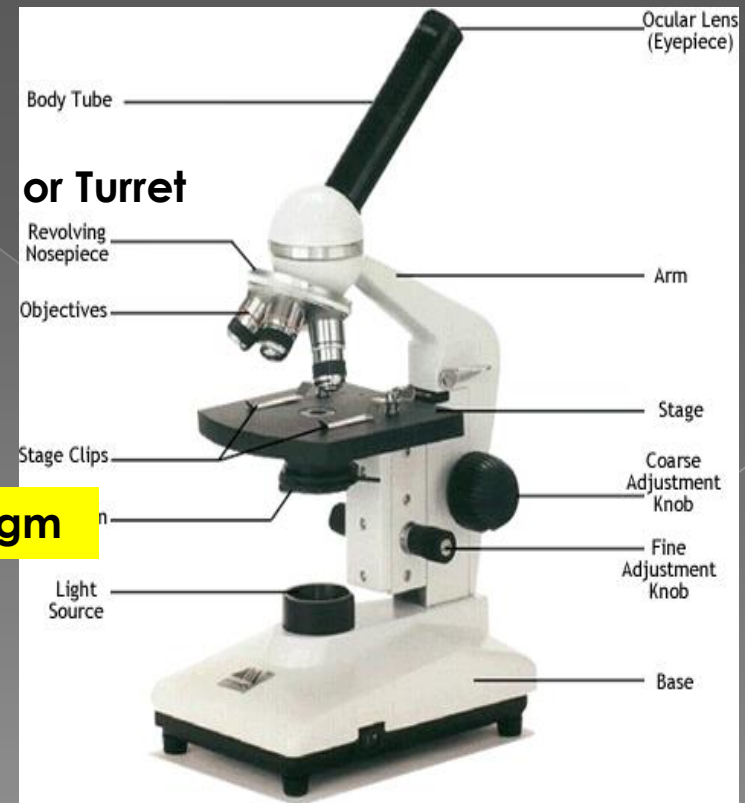
Steps for Using the Microscope:

7. Switch to high power and bring into focus using ONLY the FINE ADJUSTMENT KNOB.
 - Do NOT use the COURSE ADJUSTMENT KNOB because:
 - It can hit the lens on the slide and scratch the lens (very expensive) or break slide (much less expensive).

Lighting the FOV:

- The lower the power, the lighter the FOV (easier to see image).
- The higher the power, the darker the FOV (harder to see image).
- > **DIAPHRAGM** (adjusts the amount of light):

Disc underneath the stage that contains holes of different sizes. Dial to a larger hole to let in more light.



How to make a wet mount slide preparation

1. Take out a clear, clean slide.
2. Place 2 drops of water on the middle of the slide.
3. Carefully place specimen in the middle of water.
4. Gently lower cover slip onto water drops.
5. Repeat if the following happens...
 - A. Water seeps out sides of cover slips
 - Wick away extra water seeping out by placing a piece of paper towel right next to cover slip. Hold there until all the water is gone from outside of cover slip.
 - B. Air pockets under cover slip
 - Redo.

Can't Focus?

1. Try wiping the Ocular and Objective Lenses with lens paper (not a paper towel) to remove oils.
1. Try adjusting the diaphragm to alter contrast.
1. Go back to Low Power and try focusing again.

Modern Microscopes

Light microscopes like the ones we use in class are the traditional microscope used in biology.



Pros

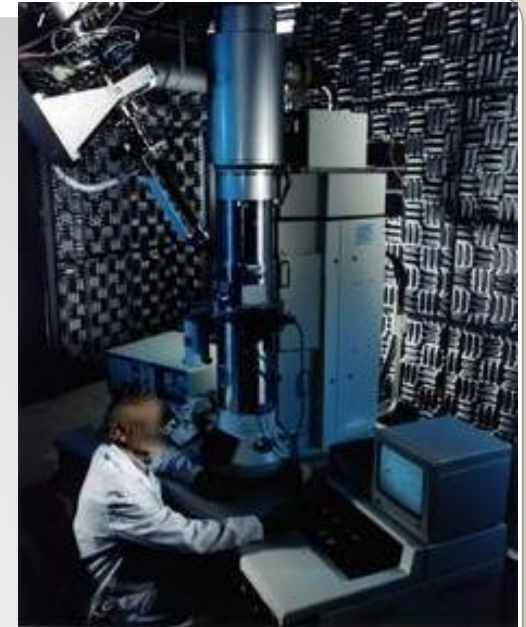
- Light weight and mobile
- Can see in color
- Can see living objects
- Relatively Cheap

Cons

- Limited magnification of up to 1000x
- Can't see the finer structures of cells or small organelles.
- Can't see viruses

Modern Microscopes

Electron microscopes were invented in the 1950's and allowed us to zoom into parts of the cell we couldn't see with light microscopes.



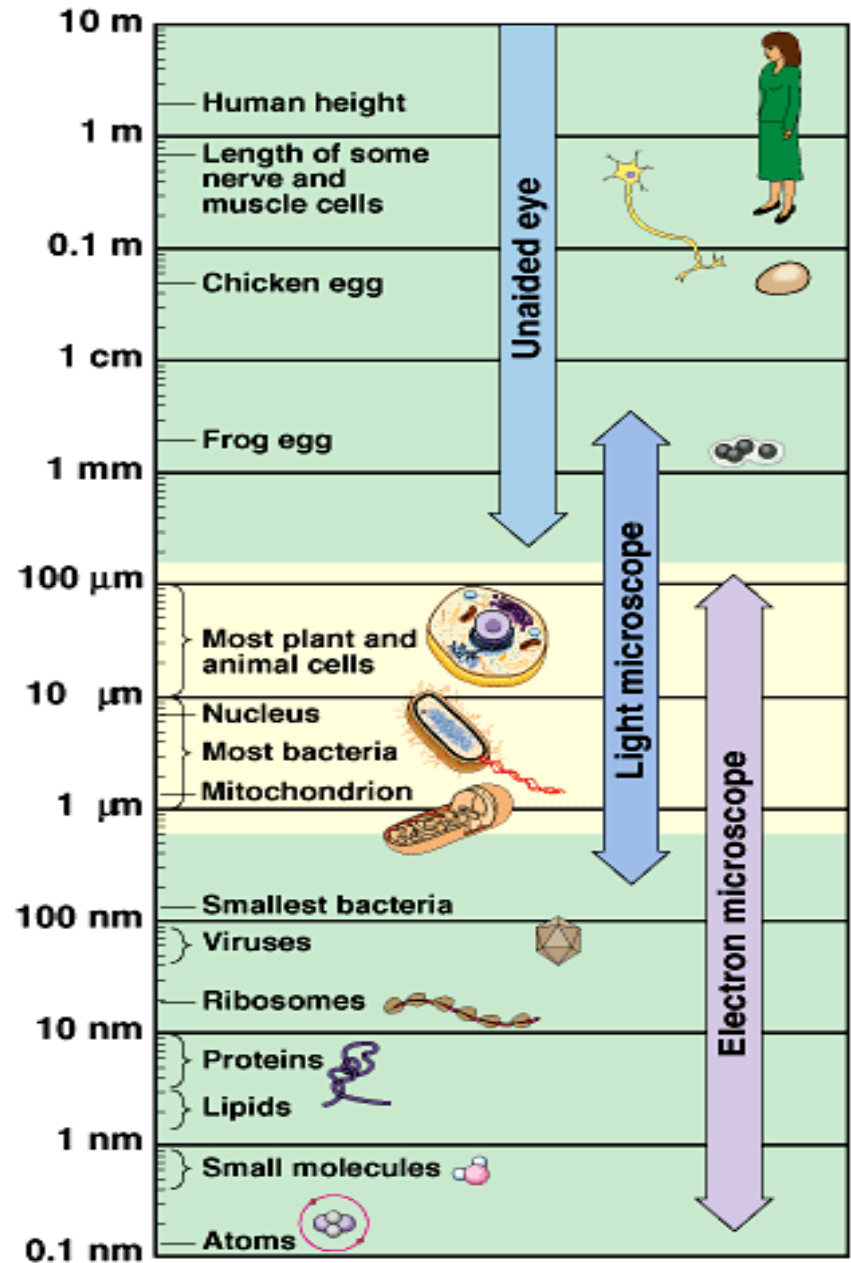
Pros

- Much higher magnification, up to 10,000,000 times!
- Can see fine structures inside cells.
- Can view viruses

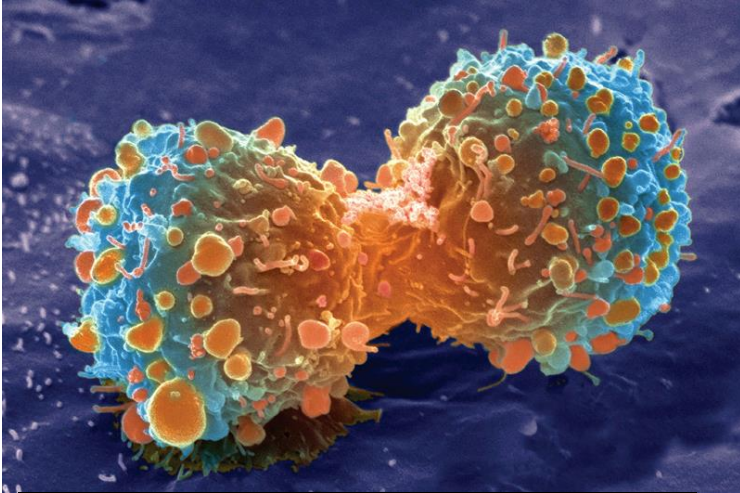
Cons

- Very large and immobile
- Can only view in B&W (color can be digitally added)
- Objects must be dead
- Very expensive

Resolving Power



Some cool pictures taken with an Electron Microscope:



Other Cool SEM pictures

<https://www.iflscience.com/technology/some-spectacular-sem-images-microscopic-world/>



