

# The Microscope

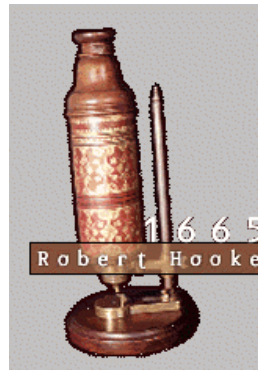


# The History

- Hans and Zacharias Janssen of Holland in the 1590's created the "first" compound microscope
- Anthony van Leeuwenhoek and Robert Hooke made improvements by working on the lenses



Anthony van Leeuwenhoek  
1632-1723



Hooke Microscope



Robert Hooke  
1635-1703

# The History



Zacharias Jansen  
1588-1631



The "First" Microscope

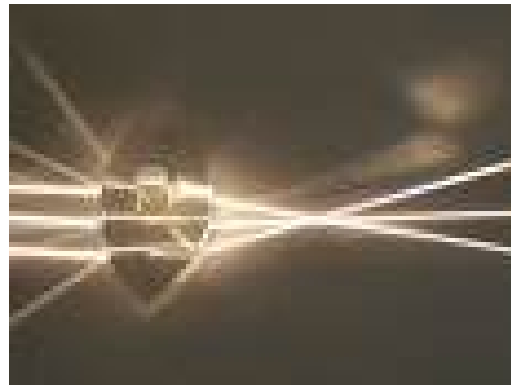
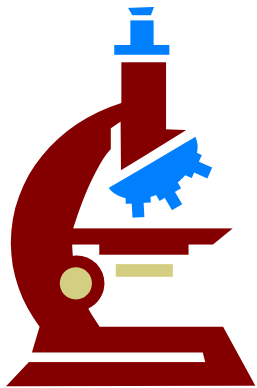
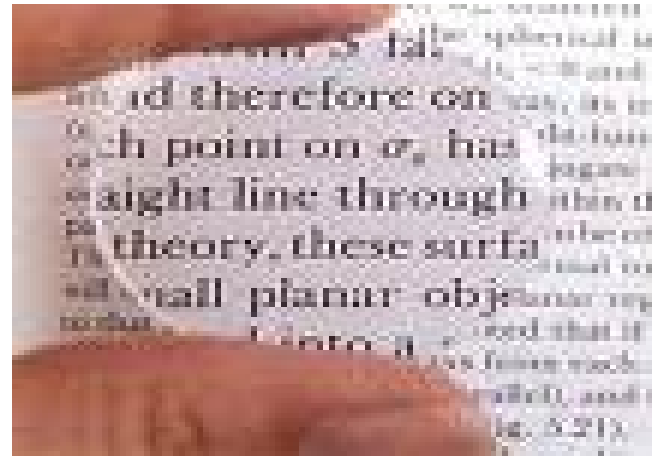
# History

- **1903** – Richard Zsigmondy developed the ultramicroscope that could study objects below the wavelength of light. He won the Nobel Prize in Chemistry in 1925.
- **1931** – Ernst Ruska co-invented the electron microscope for which he won the Nobel Prize in Physics in 1986. An electron microscope depends on electrons rather than light to view an object, electrons are speeded up in a vacuum until their wavelength is extremely short, only one hundred-thousandth that of white light. Electron microscopes make it possible to view objects as small as the diameter of an atom.



# How a Microscope Works

Convex Lenses are curved glass used to make microscopes (and glasses etc.)



Convex Lenses bend light and focus it in one spot.

# How a Microscope Works

**Ocular Lens**  
(Magnifies Image)

**Body Tube**  
(Image Focuses)

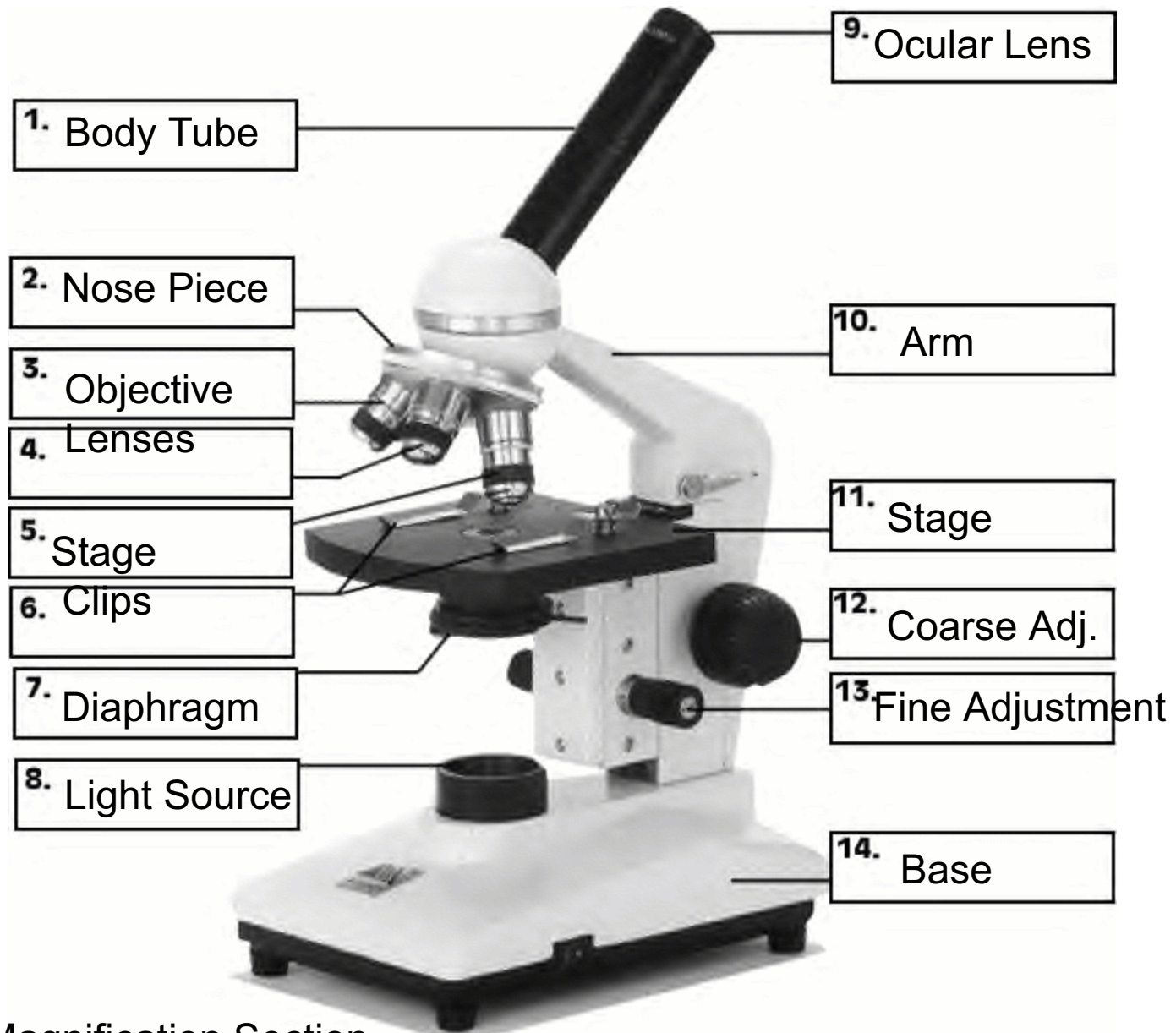


**Objective Lens**  
(Gathers Light,  
Magnifies  
And Focuses Image  
Inside Body Tube)

• **Bending Light:** The objective (bottom) convex lens magnifies and focuses (bends) the image inside the body tube and the ocular convex (top) lens of a microscope magnifies it (again).

# The Parts of a Microscope





Skip to Magnification Section



# Body Tube

- The body tube holds the objective lenses and the ocular lens at the proper distance



Diagram

# Nose Piece

- The Nose Piece holds the objective lenses and can be turned to increase the magnification



Diagram

# Objective Lenses

- The Objective Lenses increase magnification (usually from 10x to 40x)



Diagram

# Stage Clips

- These 2 clips hold the slide/specimen in place on the stage.



Diagram



# Diaphragm

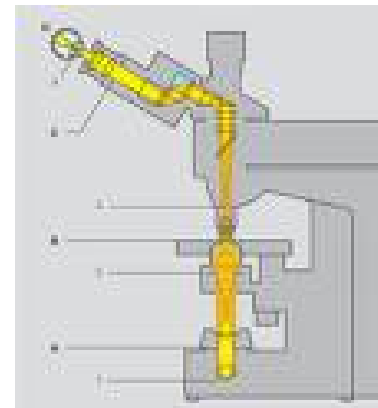
- The Diaphragm controls the amount of light on the slide/specimen



Turn to let more light in or to make dimmer.

# Light Source

- Projects light upwards through the diaphragm, the specimen and the lenses
- Some have lights, others have mirrors where you must move the mirror to reflect light



Diagram

# Ocular Lens/Eyepiece

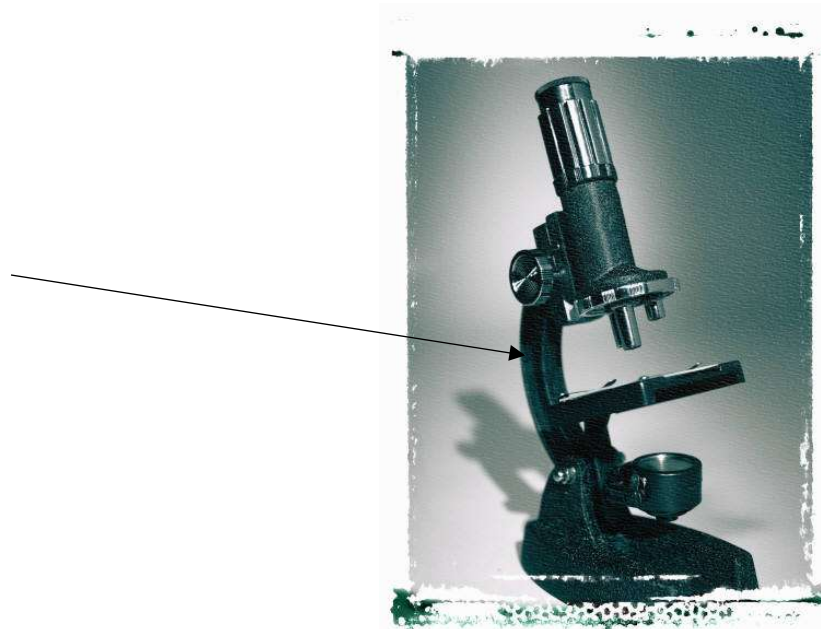
- Magnifies the specimen image



Diagram

# Arm

- Used to support the microscope when carried. Holds the body tube, nose piece and objective lenses



Diagram



# Stage

- Supports the slide/specimen



Diagram

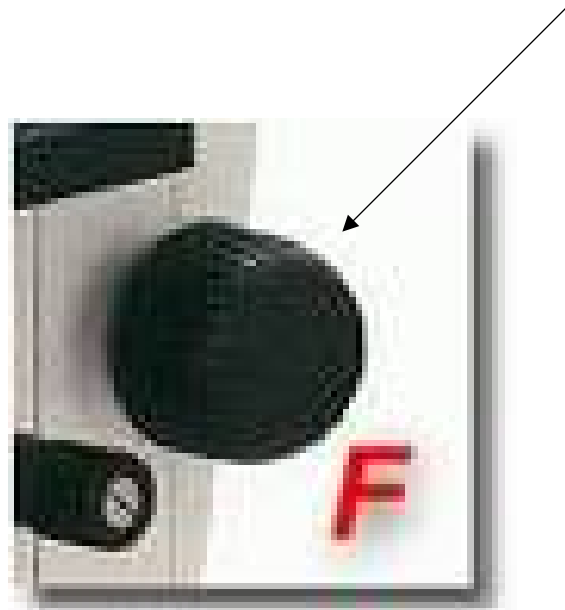


# Coarse Adjustment Knob

- Moves the stage up and down (quickly) for focusing your image



Diagram



# Fine Adjustment Knob

- This knob moves the stage SLIGHTLY to sharpen the image



Diagram

# Base

- Supports the microscope



Diagram



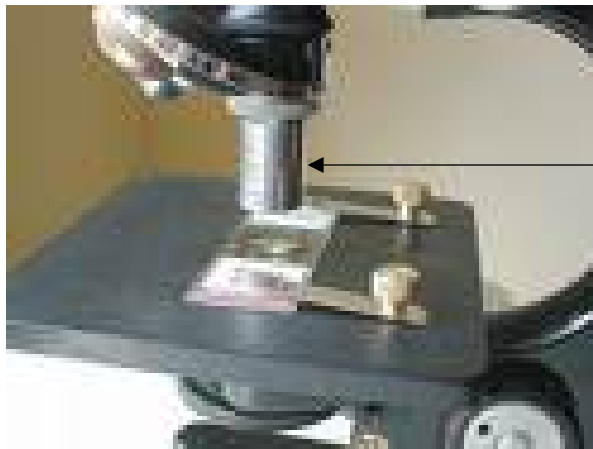
# Magnification





# Magnification

- To determine your magnification...you just multiply the ocular lens by the objective lens
- Ocular 10x Objective 40x:  $10 \times 40 = 400$



So the object is 400 times “larger”

Objective Lens have their magnification written on them.

Ocular lenses usually magnifies by 10x

# Caring for a Microscope

- Clean only with a soft cloth/tissue
- Make sure it's on a flat surface
- Only use lens paper for cleaning
- Carry it with 2 HANDS...one on the arm and the other on the base

# Carry a Microscope Correctly



# Using a Microscope

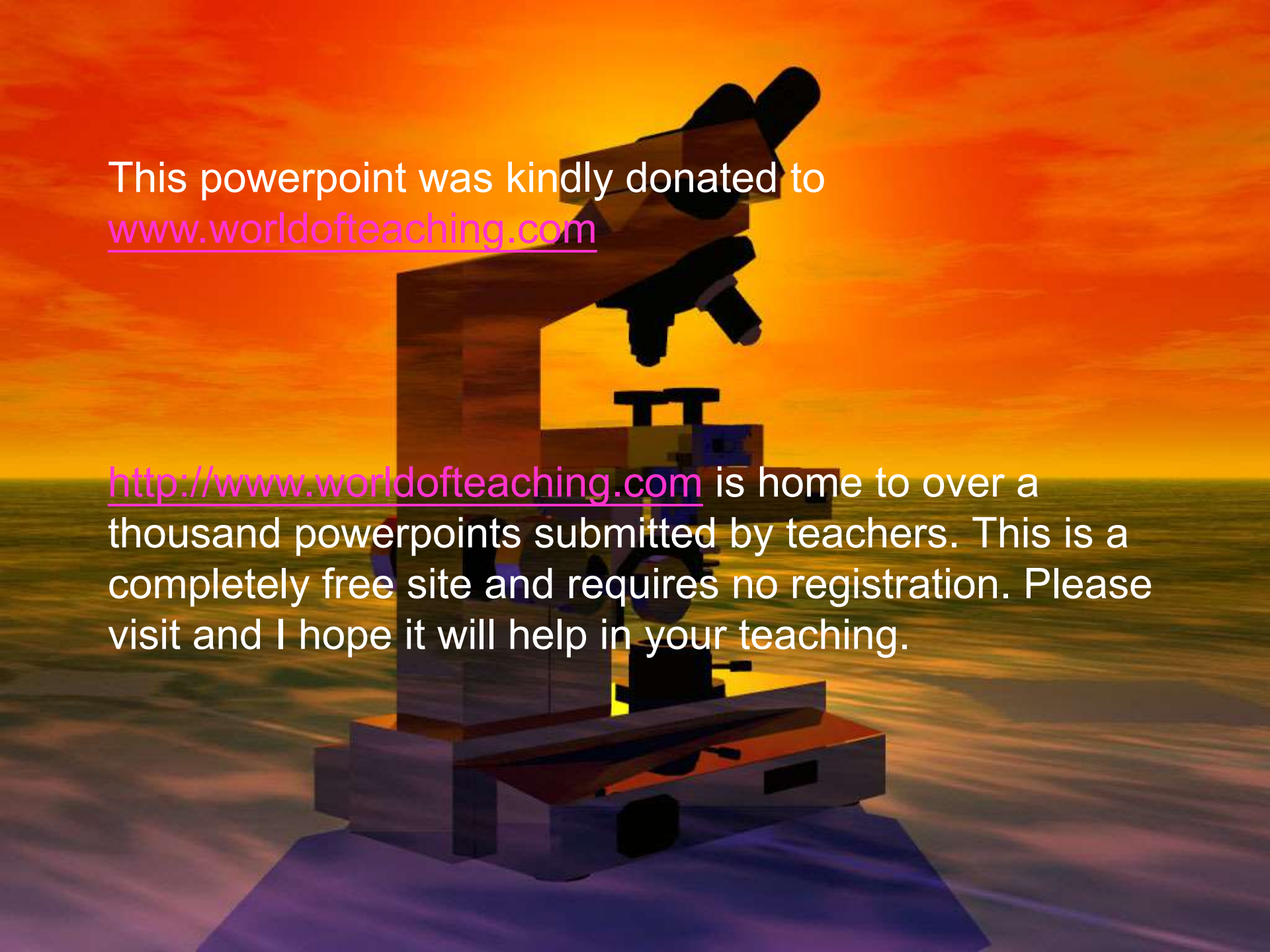
- Start on the lowest magnification
- Don't use the coarse adjustment knob on high magnification...you'll break the slide!!!
- Place slide on stage and lock clips
- Adjust light source
- Use fine adjustment to focus



# References

- [http://www.cerebromente.org.br/n17/history/neurons1\\_i.htm](http://www.cerebromente.org.br/n17/history/neurons1_i.htm)
- Google Images
- <http://science.howstuffworks.com/light-microscope1.htm>



A 3D rendered microscope is positioned in the center-left of the frame. It has a black body with a large eyepiece at the top and a stage at the bottom. The microscope is resting on a blue, draped cloth. The background is a vibrant sunset or sunrise scene with a gradient of orange, yellow, and red in the sky, and a dark, silhouetted horizon line. The overall lighting is warm and dramatic.

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