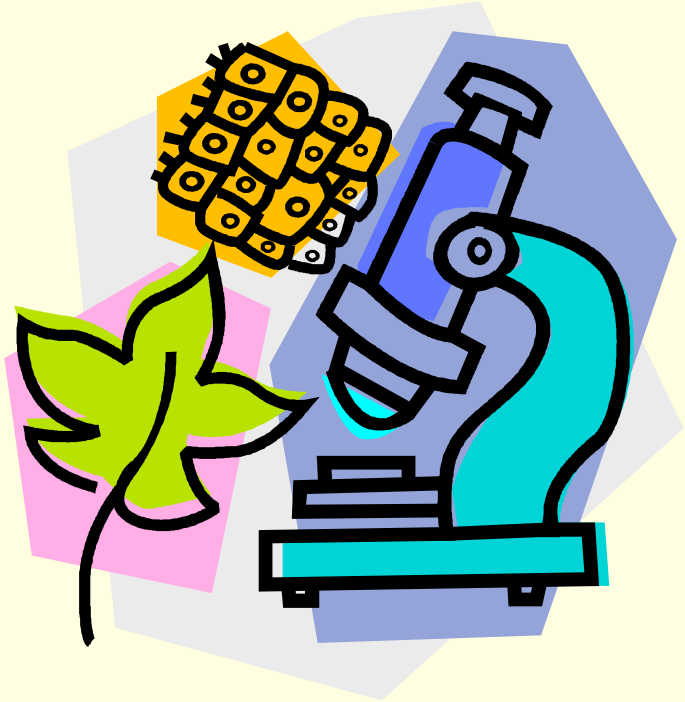
Microscope Lesson and Lab



Lesson Objectives

- **List the contributions of 5 scientists to the development of the microscope**
- **Explain the different types of microscopes**
- **Identify parts of a compound microscope**
- **Be able to correctly use a microscope**
- **Understand the difference between magnification and resolution**
- **Be able to calculate magnification**

Important Cell Scientists

- **Van Leewenhoek (late 1700s, early 1800s)**
- **Hooke (1665)**
- **Schleiden (1838)**
- **Schwann (1839)**
- **Virchow (1858)**

- **Lenses & Microscopes**
- **Cellular nature of cork**
- **Plant cells**
- **Animal cells**
- **All cells from preexisting cells**

Cell Theory

- **All living things are made up of cells**
- **Cells are the units of structure and function**
- **All cells arise from preexisting cells**

"In the year of 1657 I discovered very small living creatures in rain water."

World's Greatest 1000 Creation Scientists 2000

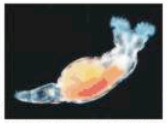
ANTONY VAN LEEUWENHOEK

1632 - 1723

Microscopy • Microbiology

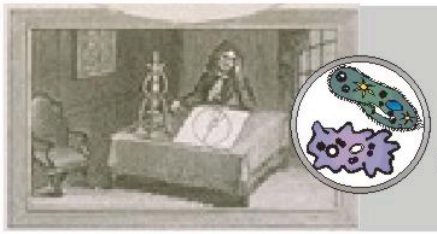
- Invented a 270x microscope, a tenfold improvement over earlier models
- Discovered bacteria, protozoa and rotifers sperm and blood cells; observed for 50 years
- No formal scientific training, but elected to the Royal Society
- Refuted spontaneous generation of life

One of Leeuwenhoek's microscopes, approximate actual size (5 cm)



Philodena, a rotifer, 220x

"He often referred with reverence to the wonders God designed in making creatures small and great . . . Leeuwenhoek's life glorified God in many ways, but perhaps most by showing us that there is far more under the sun than we had first suspected." – Dan Graves, *Scientists of Faith*



"It would indeed be a miracle to get these animalcules by chance."

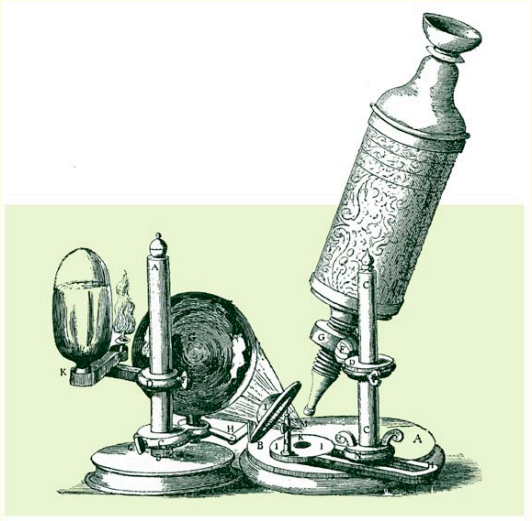
– Antony van Leeuwenhoek

Early Cell Scientists

ANTON VAN LEEUWENHOEK

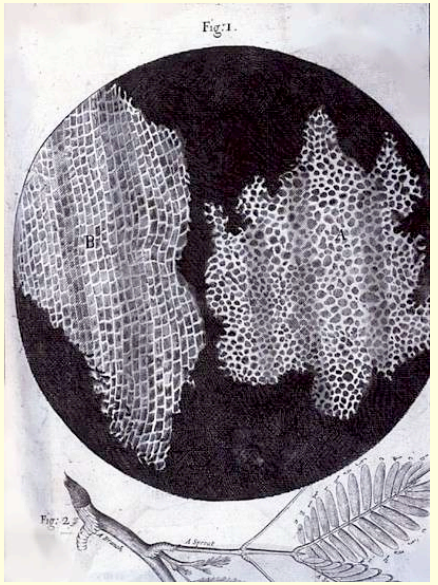
MATTHIAS SCHLEIDEN

THEODOR SCHWANN



Early Microscope

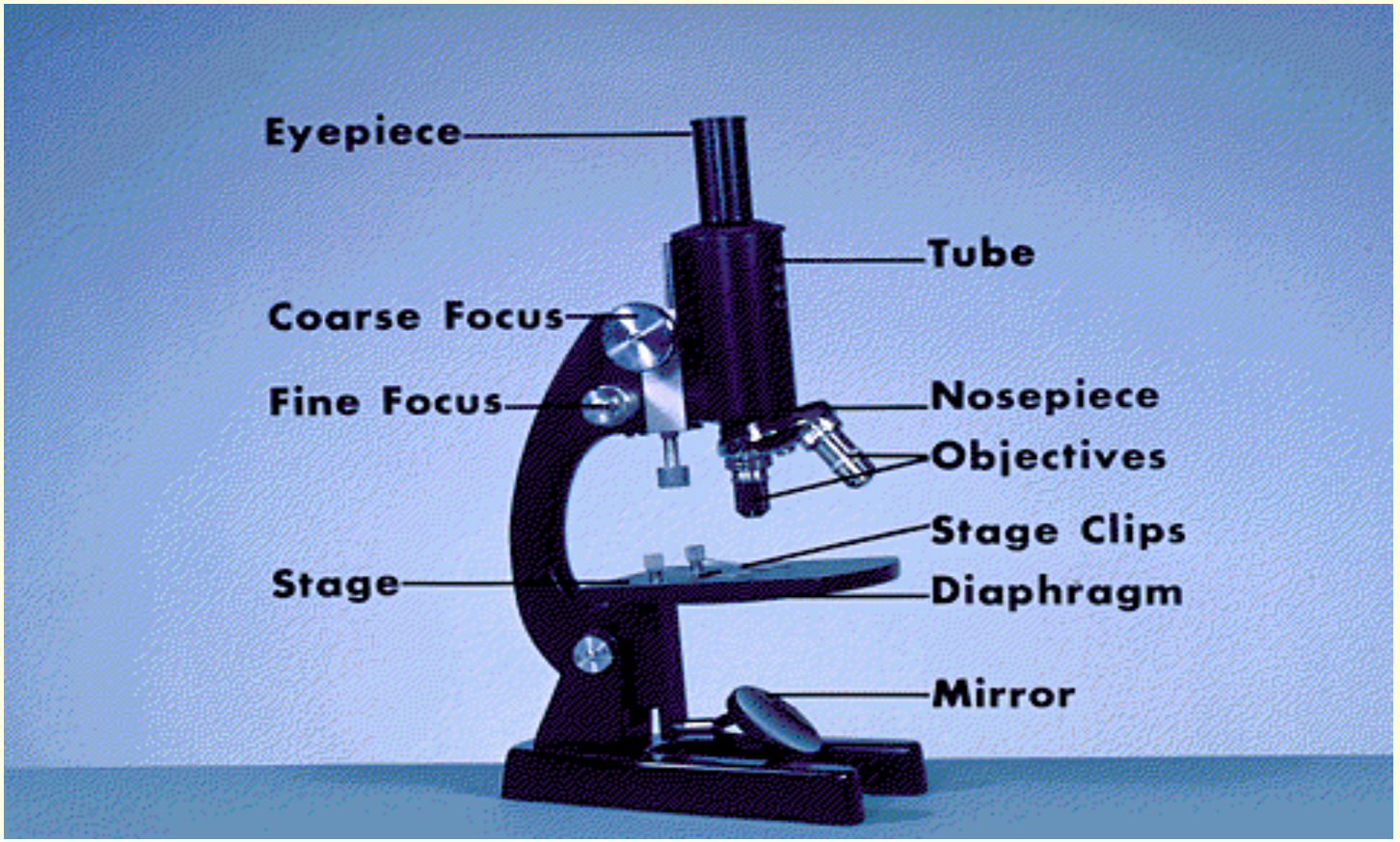
Robert Hooke



Cork Cells

Microscopes

One or more lenses that makes an enlarged image of an object.



Types of Microscopes

- Simple
- Compound
- Stereoscopic
- Electron

Simple Microscopes

Similar to a magnifying glass and has only one lens.

Compound Microscopes

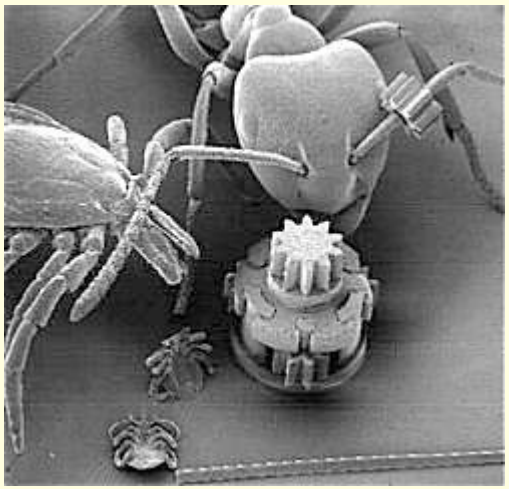
Lets light pass through an object and then through two or more lenses.

Binocular (Stereoscopic) Microscopes

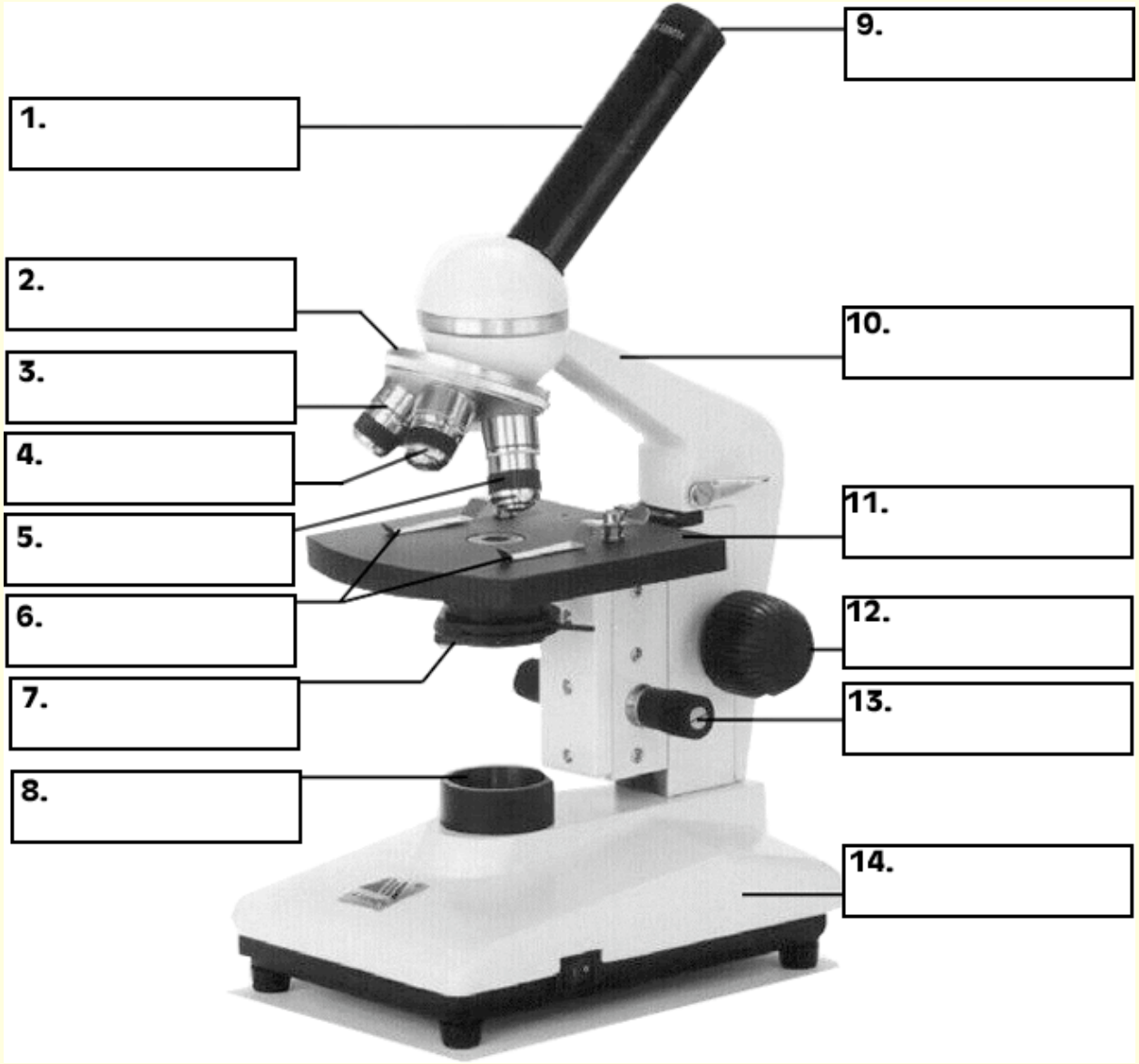
Gives a three dimensional view of an object. (Examples: insects and leaves)

The Electron Microscope

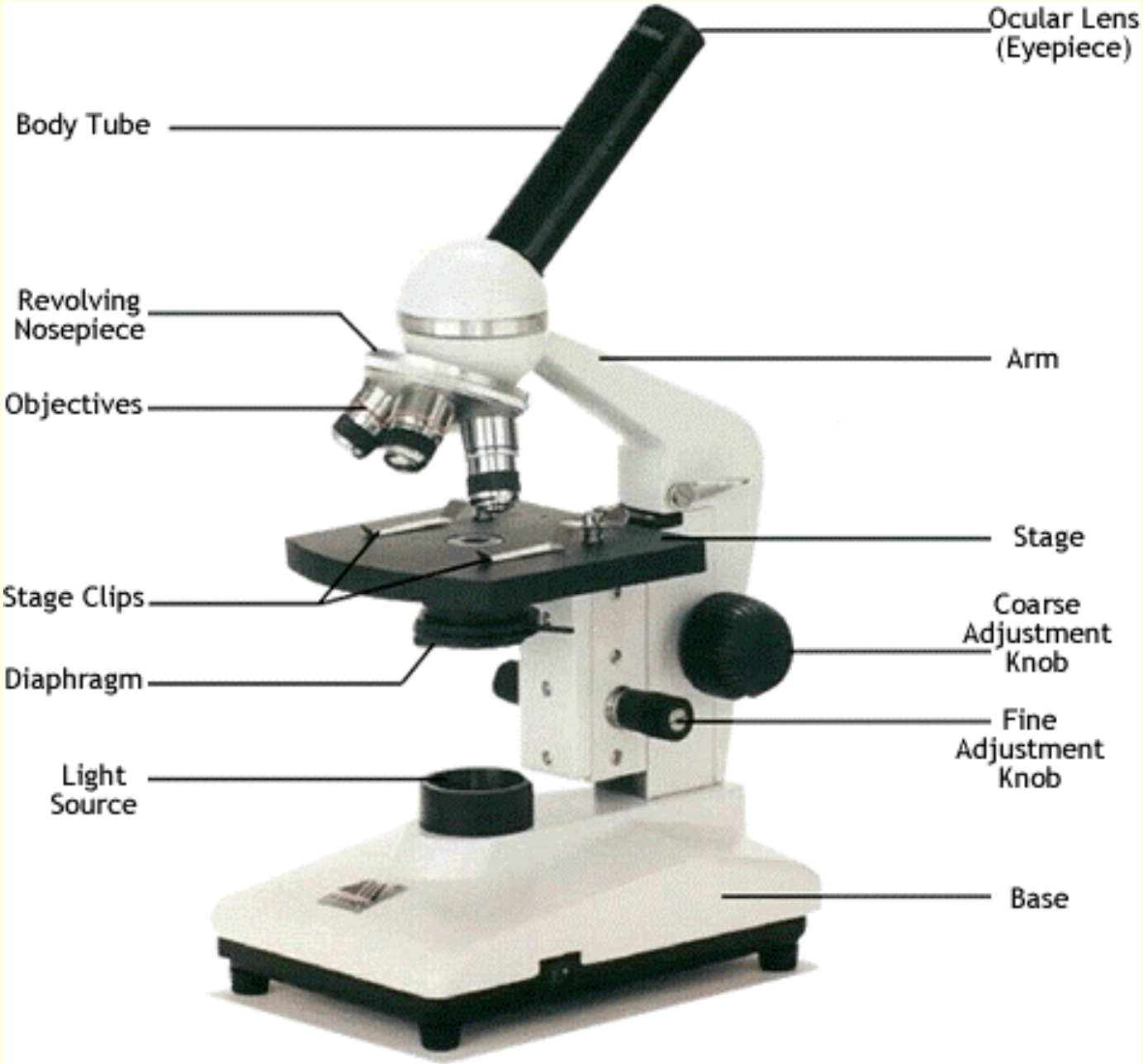
Electron Micrographs



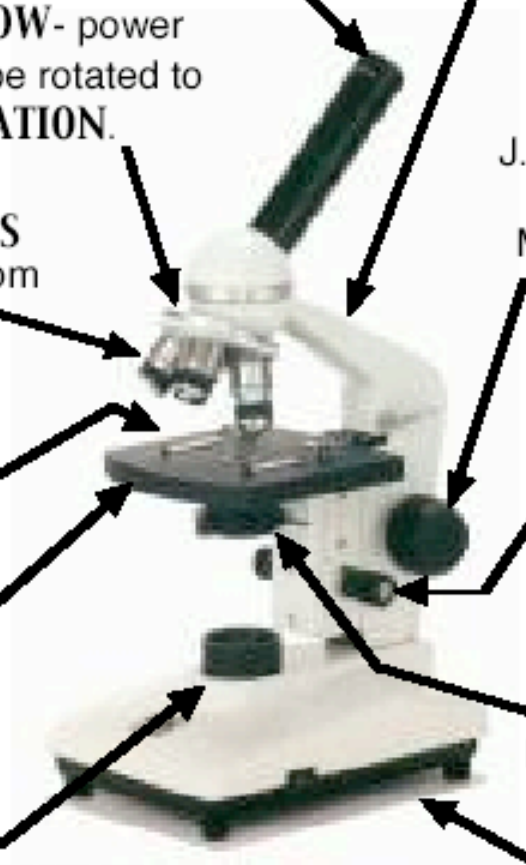
3.1 Parts of a Microscope



Microscope Parts



PARTS OF THE LIGHT MICROSCOPE



A. **EYEPIECE**
Contains the **OCULAR** lens

B. **NOSEPIECE**
Holds the **HIGH**- and **LOW**- power objective **LENSES**; can be rotated to change **MAGNIFICATION**.

C. **OBJECTIVE LENSES**
Magnification ranges from **10** X to **40** X

D. **STAGE CLIPS**
HOLD the slide in place

E. **STAGE**
Supports the **SLIDE** being viewed

F. **LIGHT SOURCE**
Projects light **UPWARDS** through the diaphragm, the **SPECIMEN**, and the **LENSES**

G. **BASE**
Supports the **MICROSCOPE**

H. **DIAPHRAGM**
Regulates the amount of **LIGHT** on the specimen

I. **FINE ADJUSTMENT KNOB**
Moves the stage slightly to **SHARPEN** the image

J. **COARSE ADJUSTMENT KNOB**
Moves the stage up and down for **FOCUSING**

K. **ARM**
Used to **SUPPORT** the microscope when carried

A. _____
Contains the _____ lens

B. _____
Holds the ____- and ____- power objective _____; can be rotated to change _____.

C. _____ _____
Magnification ranges from ____ X to ____ X

D. _____ _____
_____ the slide in place

E. _____
Supports the _____ being viewed

F. _____ _____
Projects light _____ through the diaphragm, the _____, and the _____

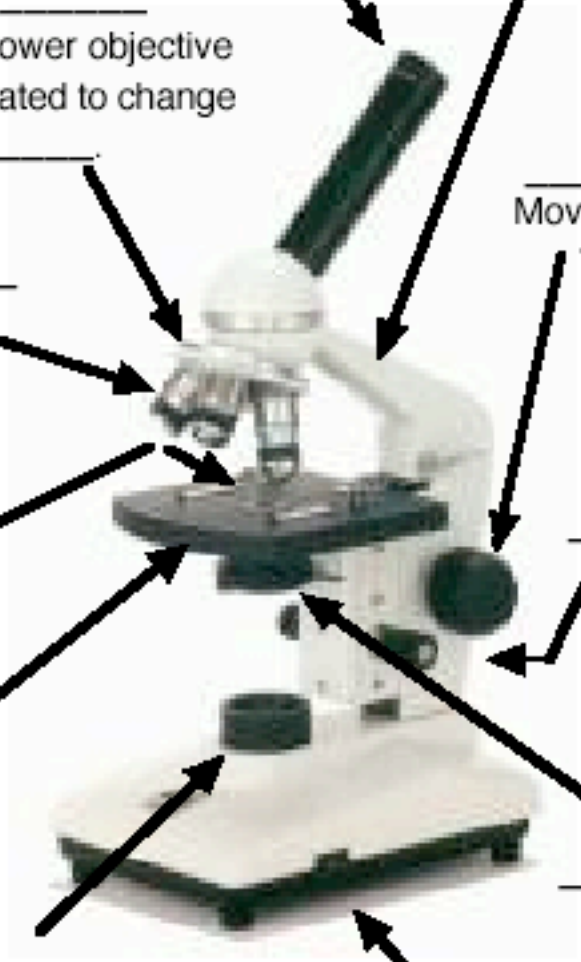
G. _____
Supports the _____

H. _____
Regulates the amount of _____ on the specimen

I. _____
_____ _____
Moves the stage slightly to _____ the image

J. _____
_____ _____
Moves the stage up and down for _____

K. _____
Used to _____ the microscope when carried



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Lab Objectives

- **Review parts of the microscope**
- **Find specimens under low and high power**
- **Make a wet mount**
- **Be able to correctly use a microscope**
- **View cheek cells under the microscope**
- **View Volvox under the microscope**
- **Observe Pond water under the microscope and carefully draw what is observed**

Lab Directions (30 minutes)

- **Unsafe behavior = immediate loss of lab privledge**
- **Assigned partners and stations**
- **Drawings and answers to questions on a separate sheet !!!**
- **Letter “e”**
- **Cheek cells**
- **Elodea leaf- No ! (Skip)**
- **Sketch Prepared Slide of Volvox**
- **Pond Samples- Read over directions on making a wet mount; Put drawings on handout and include the magnification used (ocular X objective = total magnification)**

Seat Work 30 minutes

- **Complete Microscope Handout**
- **Work on Microscope Unit Review**
- **Review parts of microscope- Vocabulary Challenge Cards (Cut out)**
- **Quiz on Tuesday of next week !**

Laboratory Clean up

- **You will be graded on the completeness of your answers to the analysis questions and on the careful and detailed drawings you make.**
- **I will be quizzing you on the parts of the microscope**
- **Your grade is also dependent on you returning all supplies to the tray and cleaning up your lab space. I will give you a 5 minute reminder.**
- **All slides need to be cleaned and put back on the tray. You may throw away cover slips.**

Basic Microscope Technique

- **Working Distance:**
  - **distance between the specimen and the objective lens**
- **Depth of Field:**
  - **thickness of the specimen that may be seem in focus at one time**

Basic Microscope Technique

- **Calculating Total Magnification:**

- **Multiply the magnification of the ocular lens by the magnification of the objective lens**

Magnification vs. Resolving Power

- **Magnification:**

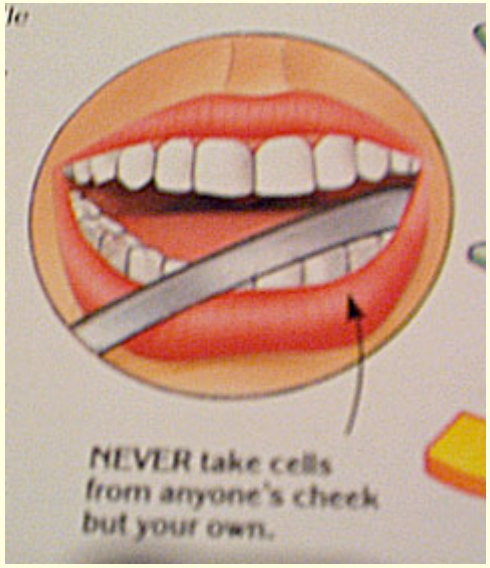
  - **the ratio of an object's image to it's real size**

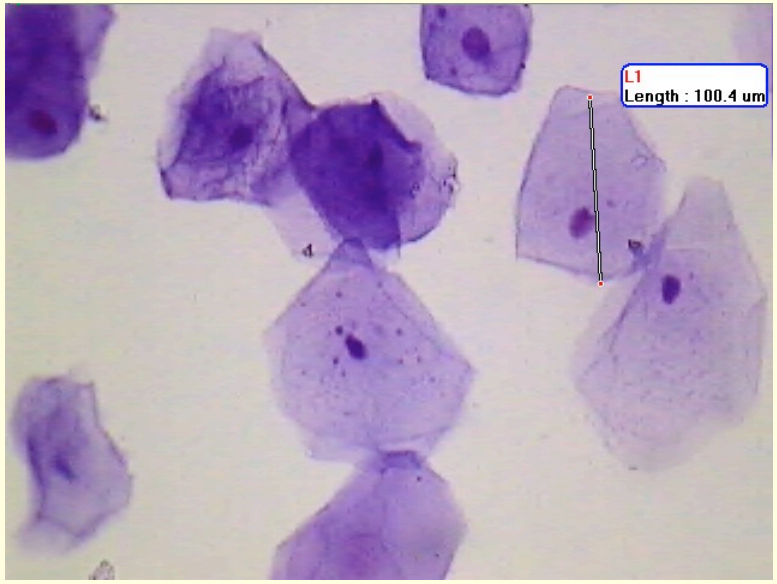
- **Resolving Power:**

  - **measure of image <u>clarity</u>. The minimum distance two points can be separated and still be distinguished as two separate points**

Letter “E”

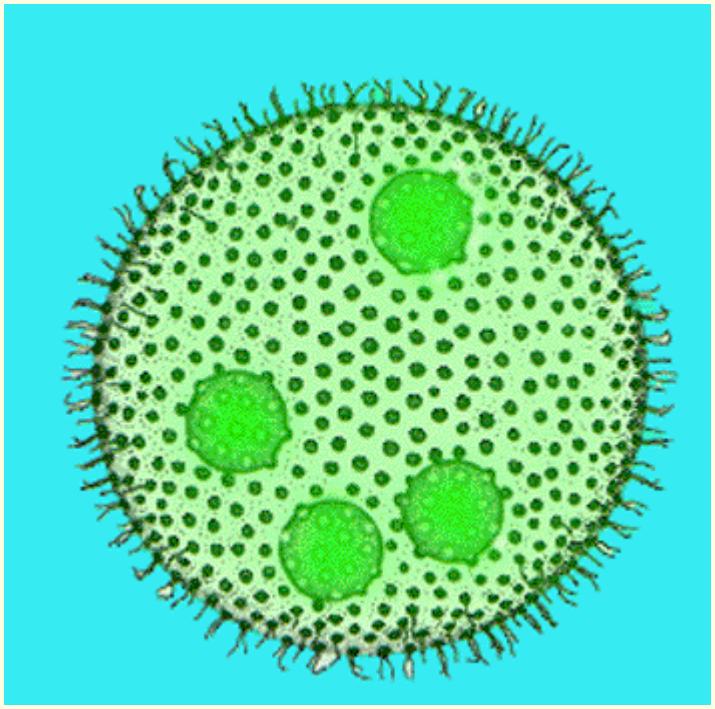
Cheek Cells





Animal Cells

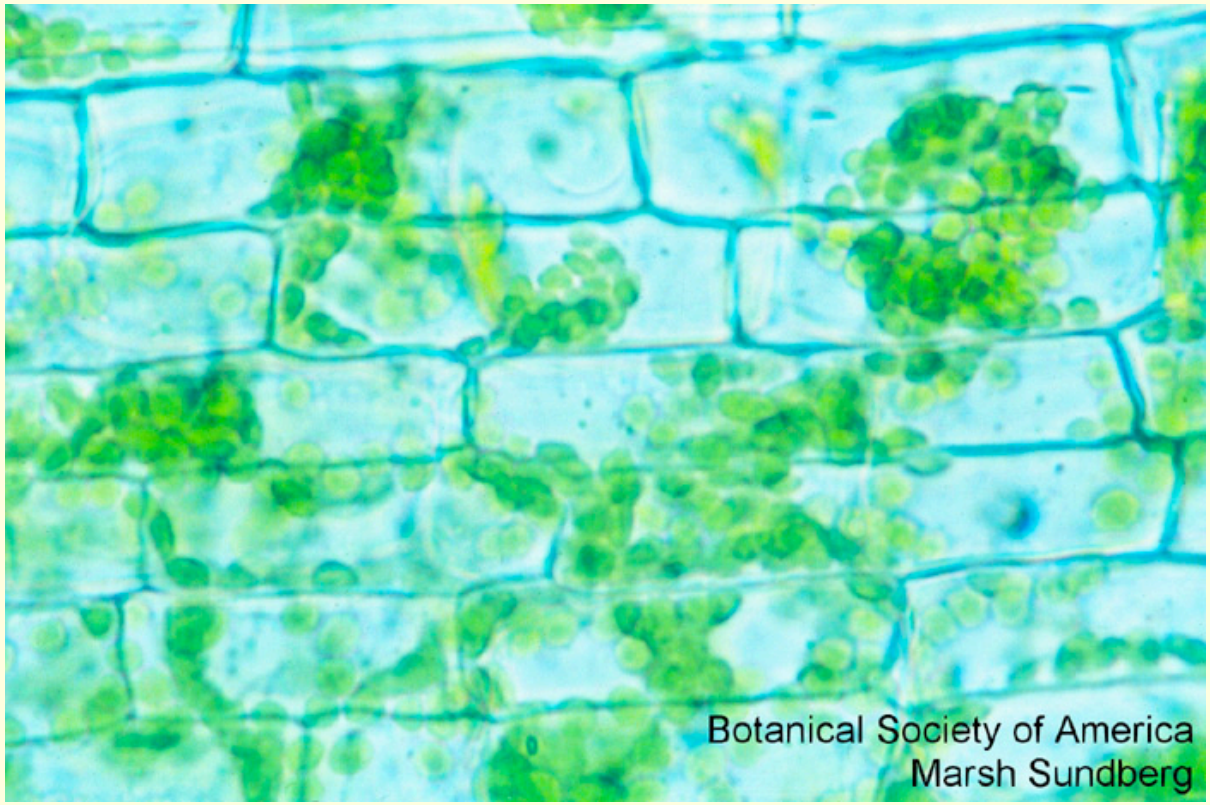
Prepared Slide of….



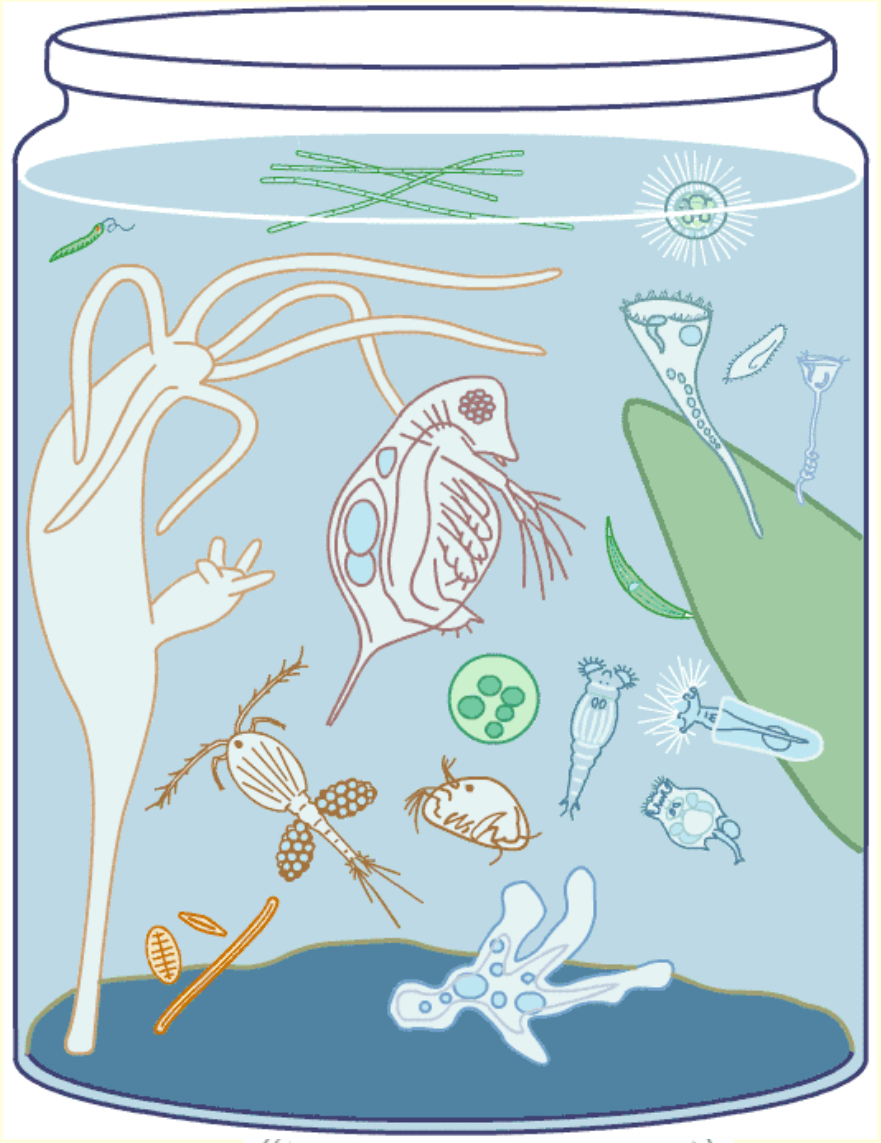
Volvox

Microscope Lab

- **Observe the structure of an *Elodea* leaf at increasing magnification**



Pond Sample



Virtual Microscope
SIMULATION