Chapter 3: A View of the Cell

Section 1.4

I. Microscopes & Measurements

A. Anton ***van Leeuwenhoek*** was the first to use a **simple single** lens light microscope in the 1600s.

First to observed "animalcules" in pond water.

B. Over the next 200 years scientist greatly improved the microscope by grinding ***higher quality lenses*** and developing the ***compound light microscope***.

C. Compound light microscope uses a ***series of lens and light*** to magnify objects.

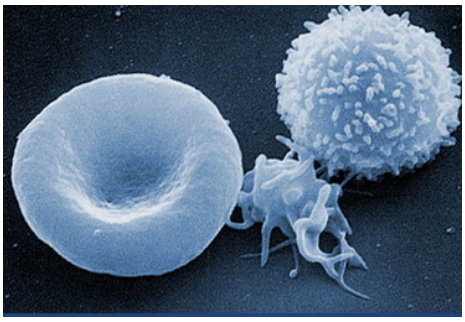
D. Can magnify objects up to about ***1500 times (x)***.

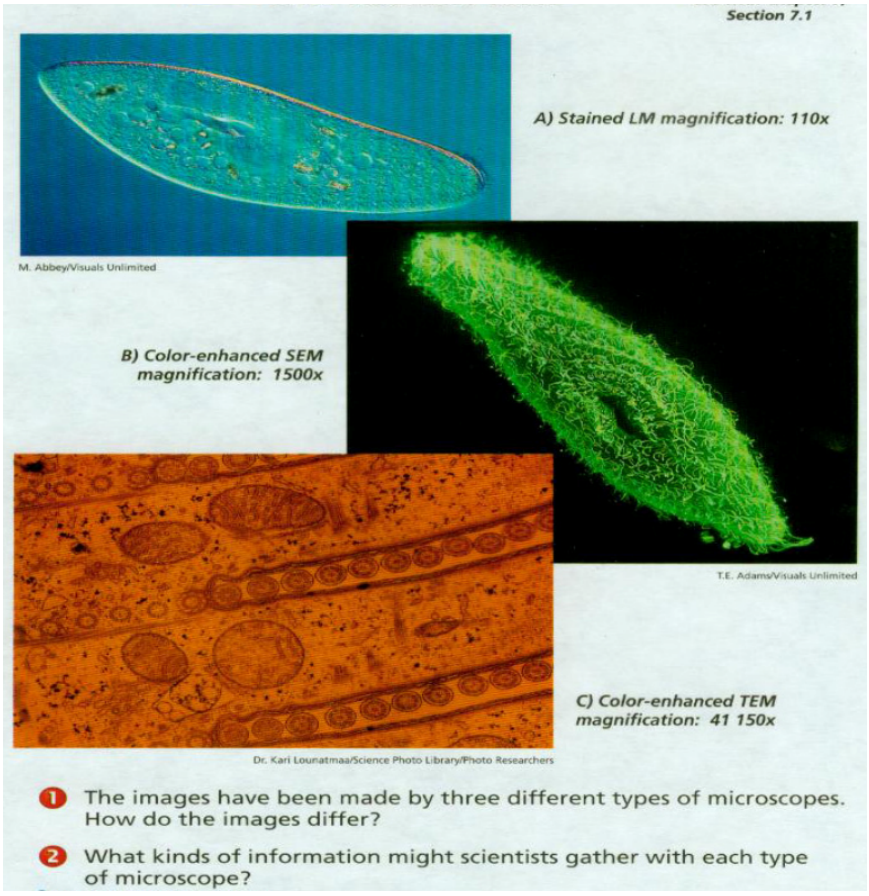
E. **Electron Microscopes -** Which ***use a beam of electrons*** **to magnify** structures **up to 1,000,000 X**.

Types of electron microscopes:

-Scanning electron microscope *(SEM)* - beam of **electrons *scan the surface*** of an object **to view the 3-D shape**. *Specimens are dead.*

-Transmission electron microscope *(TEM)* - beam of **electrons *transmitted through a substance*** to see the inside. *Specimens are dead.*





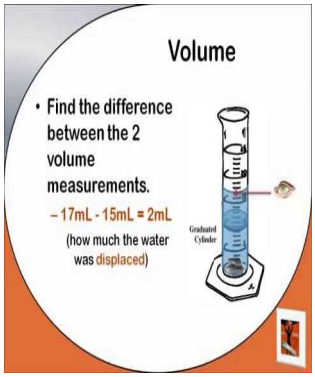
F. Measurements in Science

- All scientists must be able to understand one another, so a common system of measurement must be used. It is called the ***I*nternational System of Measurement** ***(SI)*** or ***metric***.

- In biology, the metric units you will encounter are = **meter (m), gram (g), liter (l), second (s), and Celsius degree (C°), *micrometer (μm) -* used to measure microscopic organisms.**

- ***Accuracy*** = how close a measurement is to the true value of the quantity measured.

– ***Precision*** = the exactness of a measurement.



Length
meters
millimeters (10^{-3} m)
micrometers (10^{-6} m)
nanometers (10^{-9} m)

Temperature
K = Kelvin
C = Celsius
F = Fahrenheit
K = 273+C
F = C*9/5+32

Mass
kilograms (10^{3} g)
grams
milligrams (10^{-3} g)

Time
hours
minutes
seconds

Section 3.1
I. Cell Theory

A. ***Robert Hooke*** first observed cells in cork (tree) and named them after the simple rooms monks lived in, at the time, "cells".

B. Matthias ***Schleiden*** observed a variety of plants, determined that all plants are composed of cells.
C. Theodor ***Schwann*** determined that all animals, and all living things are composed of cells.
D. Rudolph ***Virchow*** stated all cells come from other cells.

ADD TO NOTES:

Robert Brown first ***noted a structure forming before the cell divided, then disappeared (mitosis); Virchow*** then ***named it the nucleus*** after observing what the mitosis process.

E. **The cell theory was composed from the ideas of these three men**:

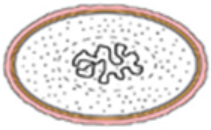
1. All organisms are composed of ***one or more cells***.
2. All cells come from ***preexisting cells***.
3. The cell is the basic unit of ***structure and organization*** in organisms.

II. Two Basic Cell Types

A. ***Prokaryotes*** = cells that do not have membrane bound organelles.

B. ***Eukaryotes*** = cells that have membrane bound organelles.

Organelle = ***small, specialized structure* within a cell that carries out a ***specific function***.



Prokaryotic Cell

Animal (Eukaryotic) Cell

C. ***Most unicellular*** organisms are prokaryotes, and ***most multicellular*** organisms are eukaryotes. (Exceptions: most ***protists and one type of fungus are unicellular***, BUT eukaryotic).

D. ***Both*** **eukaryotes and prokaryotes share characteristics**

1) cell or ***plasma*** membrane,
2) ***cytoplasm*** **,**
3) ***ribosomes*** , and
4) genetic material - ***DNA and RNA*** .