NOTES 1.3

Chapter 1 - Cells: The Building Blocks of Life
Lesson 3 – Microscopes: Discovering Cells

The Development of Microscopes

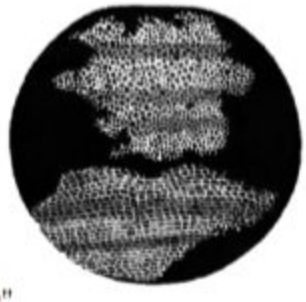
Have you ever used a magnifying glass, or lens, to see an object in more detail? If so, you have used a tool similar to the first microscope. Using microscopes, people can see details that cannot be seen with the unaided eye. People have used microscopes to discover many things about organisms.

Cells are the basic units of structure and function in living things... the building blocks of life. But until the late 1500's, there was no way to see cells. No one even knew they existed.

In 1590, the microscope was invented, and it enabled people to discover and learn about cells.

people 1st saw & described cells – (2 are here the other 2 will be presented in the next set of NOTES)

1. Robert Hooke



- English scientist and inventor
- 1663, sliced cork and observed its structure
- saw/discovered tiny little boxes he called "cells"

Q: How are cells similar to bricks in a building? How are they different?

Q: How is this microscope different than modern microscopes of today? How is it similar?

Hooke Microscope (circa 1670)

2. Anton van Leeuwenhoek

- Dutch businessman and amateur scientist
- made his own lenses
- discovered one-celled organisms he called "animalcules" in water we now know as protists
- discovered one - celled organisms from teeth we now know as bacteria

➔ Microscopes use lenses to make small objects look larger.

Q: What is a microscope?
A: an instrument that makes small objects look larger

There are 2 properties enable you to see details clearly –

- magnification
- resolution (defined under electron microscope)

Q: What is magnification?
A: the ability to make things look larger than they are

2 Types of Microscopes

- light microscope
- electron microscope

Light Microscope

Q: What is a light microscope?
A: a microscope that uses light and lenses to enlarge an image of an object

2 types of light microscopes -

- Simple microscope (hand lens)
- Compound Microscope

Q: What is a compound microscope?
A: a light microscope that uses more than one lens to magnify an object

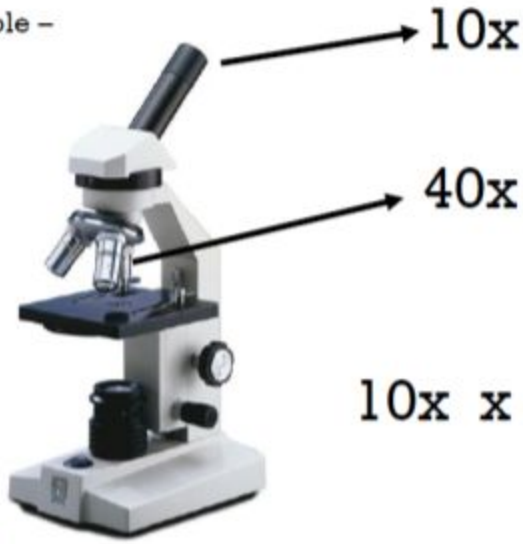
➔ Light is bent as it enters a light microscope over a (curved shape) lens.

eyepiece/ocular lens

3 objective lenses

Since compound microscopes have 2 lenses, you must multiply each of the lens magnifications to get the total magnification.

Example –



10x x 40x = 400x

Q: If one lens has a magnification of 5, and the other lens had a magnification of 50, what would the total magnification be?

A: 250x

Electron Microscope

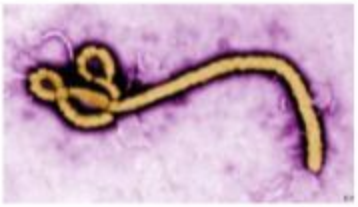
- invented in 1930
- uses a magnetic field to focus a beam of electrons through an object or onto an object's surface instead of light
- increases resolution of the image

Q: What is resolution?
A: the ability to clearly distinguish the individual parts of an object (sharpness)

2 types of electron microscopes -

- transmission **electron microscopes (TEM's)**
  - study extremely small things such as cell structures

Ex. color enhanced image of the Ebola virus that causes hemorrhagic fever



- scanning **electron microscopes (SEM's)**
  - study an object' surface

Ex. close-up of a spider

Using Microscopes

Today's microscopes are useful tools in many fields. They are used in health care, police work, science research, and industry.

Health Care

Doctors use microscopes in surgery and diagnosis of an illness and laboratory technicians use microscopes to study blood and urine samples

Police Work

Forensic scientists use microscopes to study evidence from crime scenes

Paleontologists

Use microscopes to study fossils and other materials from where the fossil was found

Engineers

Use microscopes to look for impurities in steel before use in building structures

Jewelers

Use microscopes to identify stones and can also see markings and impurities in stones that they could not see with their unaided eyes