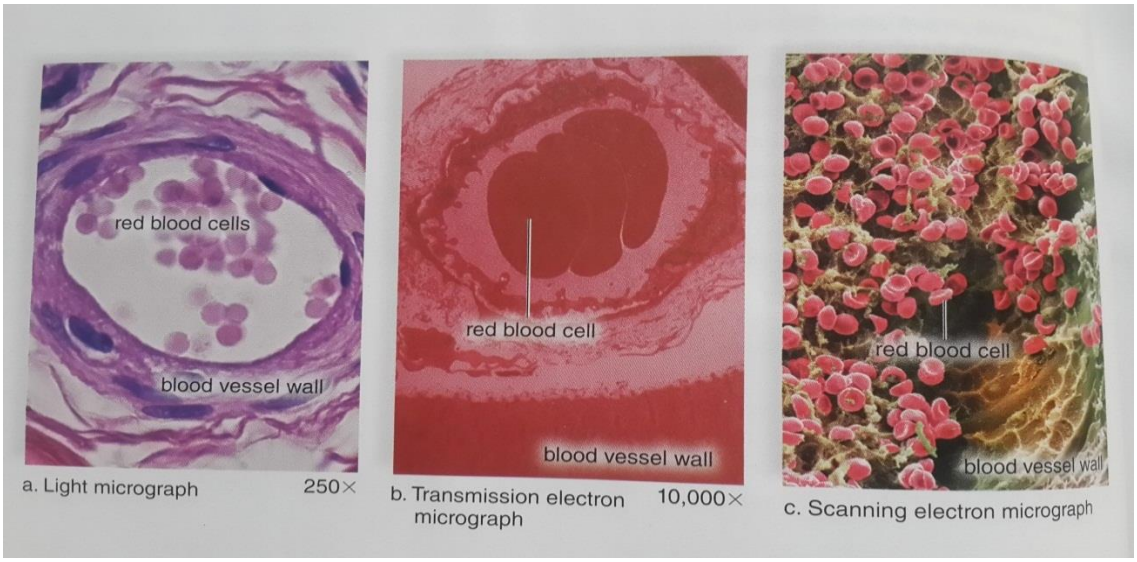
Ahlulbait University **Human biology**
College of Pharmacy **Stage : 1 st**
MSC. Etab A. AL-Mosawe **Lab:1**

Microscope

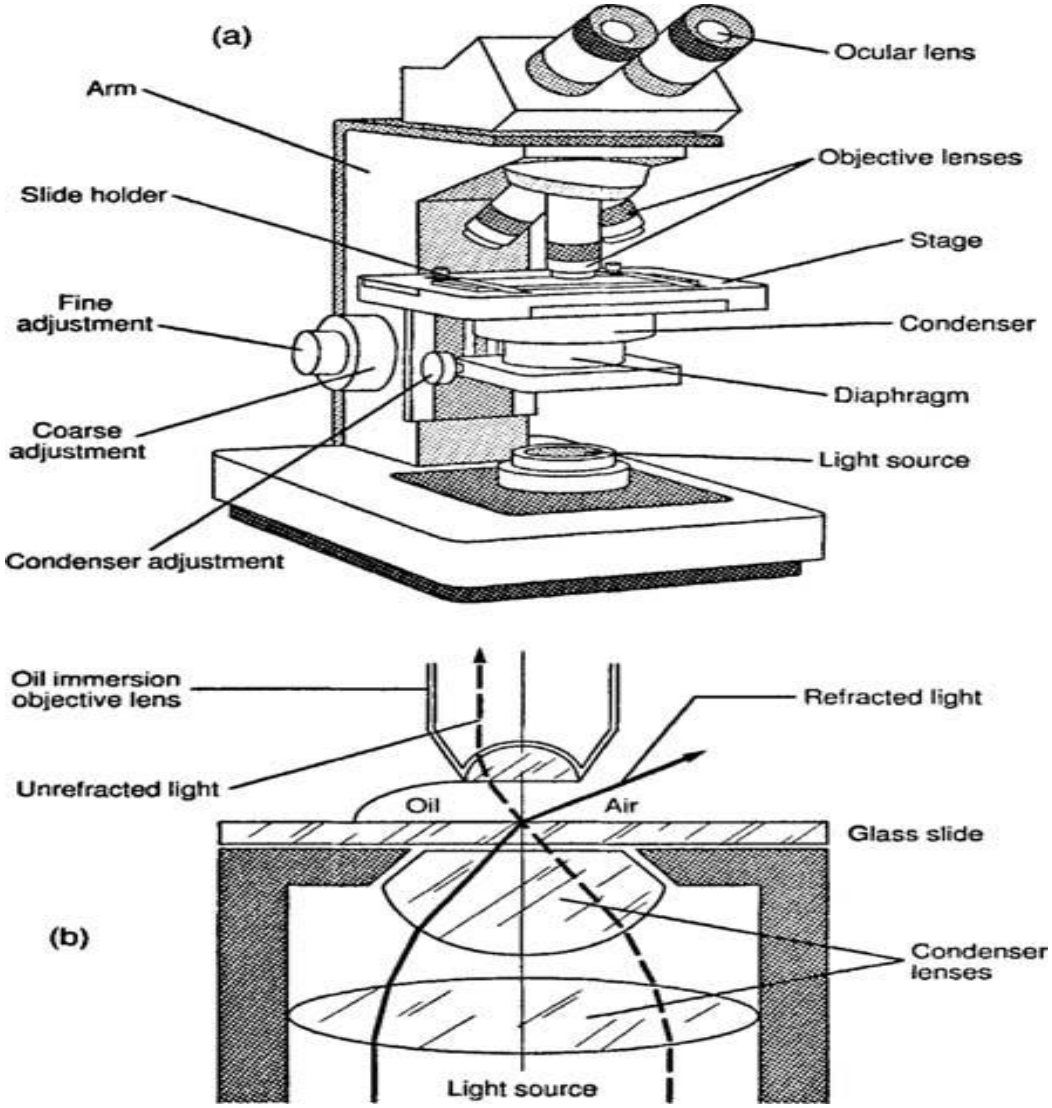
Microscopes provide scientists with a deeper look into how cells function. There are many types of microscopes, from ***compound light microscopes*** to ***powerful electron microscopes.*** ***The magnification*** or the ratio between the observed size of an image and its actual size, varies with type of microscope. In addition, ***the resolution*** of the image varies between microscopes. ***Resolution*** is the ability to distinguish between two adjacent points, and it represents the minimum distance between two objects that allows them to be seen as two different objects. Usually , the more powerful the microscope , the greater the resolution.

Three types of microscopes are most commonly used: the compound light microscope, transmission electron microscope, and scanning electron microscope. In a **compound light microscope**, uses a set of glass lenses and light rays passing through a specimen, and the resulting image is then viewed by the human eye. In the **transmission electron microscope**, used of a stream of electrons to produce magnified image. The human eye cannot see the image. Therefore , its projected onto a fluorescent screen or photographic film to produce an image(micrograph) can be viewed. The magnification produced by an electron microscope is much higher than that of a light microscope. Also, the ability of the electron microscope to make out detail in enlarged images is much greater. In other words, the electron microscope has a higher resolving power—that is, the ability to distinguish between two adjacent points. The following lists the resolving power of the eye, the light microscope, and the electron microscope: **A scanning electron microscope** provides a three dimensional view of the surface of an object. A narrow beam of electrons is scanned over the surface of the specimen, which has been coated with a thin layer of metal. The metal gives off secondary electrons, which are collected to produce a television-type picture of the specimen's surface on a screen. A picture obtained using a light microscope sometimes is called a photomicrograph, and a picture resulting from the use of an electron microscope is called a transmission electron micrograph (TEM) or a scanning electron micrograph (SEM), depending on the type of microscope used



The light microscope:

The common light microscope used in the laboratory is called a **compound microscope** because it contains two types of lenses that function to magnify an object. The lens closest to the eye is called the **ocular**, while the lens closest to the object is called the **objective.** Most microscopes have on their base an apparatus called a **condenser**, which condenses light rays to a strong beam. A **diaphragm** located on the condenser controls the amount of light coming through it. Both coarse and fine adjustments are found on the light microscope (Figure 1).



To magnify an object, light is projected through an opening in the stage, where it hits the object and then enters the objective. An image is created, and this image becomes an object for the ocular lens, which magnifies the image. Thus, the **total magnification** possible with the microscope is the magnification achieved by the objective multiplied by the magnification achieved by the ocular lens.

A compound light microscope often contains four **objective lenses:** the scanning lens (4X), the low-power lens (10X), the high-power lens (40 X), and the oil-immersion lens (100 X). With an ocular lens that magnifies 10 times, the total magnifications possible will be 40 X with the scanning lens, 100 X with

the low-power lens, 400 X with the high-power lens, and 1000 X with the oil-immersion lens. Most microscopes are **parfocal.** This term means that the microscope remains in focus when one switches from one objective to the next objective.(i.e., if the microscope is switched from a higher power objective (e.g., 40×) to a lower power objective (e.g., 10×), the object stays in focus). To increase the resolution with the oil-immersion lens, a drop of immersion oil is placed between the lens and the glass slide (Figure 1). Immersion oil has the same light-bending ability (index of refraction) as the glass slide, so it keeps light in a straight line as it passes through the glass slide to the oil and on to the glass of the objective, the oil-immersion lens. With the increased amount of light entering the objective, the resolution of the object increases, and one can observe objects as small as bacteria.

The stereo microscope, or dissecting microscope usually has a binocular eyepiece tube, a long working distance, and a range of magnifications typically from 5x to 35 or 40x.