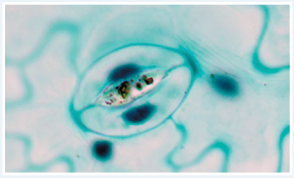
55 Optical Microscopes

Key Idea: Optical microscopes use light focussed through a series of lenses to magnify objects up to several 100 times.

The light (or optical) microscope is an important tool in biology and using it correctly is an essential skill. High power compound light microscopes use visible light and a combination of lenses to magnify objects up to several 100 times. The resolution of light microscopes is limited by the wavelength of light and specimens must be thin and mostly transparent so that light can pass through. No detail will be seen in specimens that are thick or opaque.

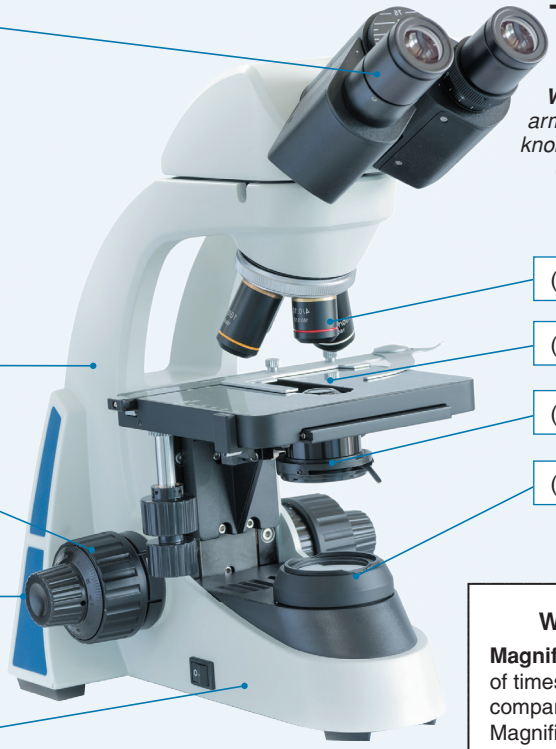
(a)



Stoma in leaf epidermis

Typical compound light microscope

Word list: *In-built light source, arm, coarse focus knob, fine focus knob, condenser, mechanical stage, eyepiece lens, objective lens*



(b)

(c)

(d)

(e)

(f)

(g)

(h)

A specimen viewed with a **compound light microscope** must be thin and mostly transparent so that light can pass through it. No detail will be seen if specimens are thick or opaque. Modern microscopes are binocular, i.e. they have two adjustable eyepieces.

What is Magnification?

Magnification refers to the number of times larger an object appears compared to its actual size. Magnification is calculated as follows:

Objective lens power **X** Eyepiece lens power

(i)

(j)

(k)

(l)

Knob for the adjustment of the microscope on the arm

Apple seeds

(m)

Dissecting microscope

Word list: *Focus knob, stage, eyepiece lens, objective lens, eyepiece focus*

What is Resolution?

Resolution is the ability to distinguish between close together but separate objects. Examples of high and low resolution for separating two objects viewed under the same magnification are given below.

High resolution

Low resolution

Dissecting microscopes are a special type of binocular microscope used for observations at low total magnification (X4 to X50), where a large working distance between the objectives and stage is required.

A dissecting microscope has two separate lens systems, one for each eye. Such microscopes produce a 3-D view of the specimen and are sometimes called stereo microscopes for this reason.

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