

The compound light microscope



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The familiar compound light microscope is a series of lenses (hence “compound”) that focus visible light in such a way as to produce a magnified image. A single lens, often called a magnifying glass, cannot generally magnify images as much as a series of lenses although Antony van Leeuwenhoek, the first microbiologist, used a simple, albeit exquisitely crafted, lens to discover single-celled “animalcules,” as he called them.

Advantages: Basic compound light microscopes are inexpensive and relatively easy to use. Since they work in visible light, the images are in full color.

The images are also in real time: You can watch the animalcules wiggle right there on the slide. **Disadvantages:** Preparing slides for viewing can be tricky for some people. As well, visible light has wavelengths ranging from 400 to 700 nm, placing a lower limit on the size of objects that can be resolved.

Dissecting Microscope A variation on the compound light microscope, a dissecting microscope is designed to be used while dissecting a specimen. It is also sometimes called a stereoscope because there are two eyepieces and lens assemblies, affording the user a binocular image of the specimen and thus a sense of depth.

Advantages: Like the basic compound light microscope, dissecting microscopes are inexpensive and even a little easier to use since one does not need to prepare a slide. They also provide full-color, real-time images in three dimensions. **Disadvantages:** Since they are designed to be used on fairly large specimens that are being directly manipulated by the user, dissecting microscopes do not magnify images as much as other microscopes. **Scanning Electron Microscope** Instead of photons of visible

light, a scanning electron microscope scans a beam of electrons across a target and then constructs an image from the way the electrons bounce off it.

Since electrons have a much smaller wavelength than visible light, the electron microscope is capable of resolving much smaller objects.

Advantages: The electron microscope can create finely detailed perspectives of extremely tiny objects. Disadvantages: Electrons do not bounce off all materials, so the target in an electron microscope must be carefully prepared by coating it with a layer of gold, making it impossible to take micrographs of living creatures. As well, the process can only produce still images in black and white.