

ADVANTAGES OF LIGHT AND ELECTRON MICROSCOPES

Light microscopes	Electron microscopes
Material can be prepared easily for examination. Often, a sample can simply be placed on a slide with a few drops of water and a cover slip. An image can be obtained within seconds.	Preparation of material for examination always involves a long series of procedures. These take several days to complete and often involve the use of toxic chemicals.
Living material can be examined, so do not always have to be killed. There is less danger of artificial structures appearing and causing confusion if the specimen is still alive.	Living material cannot survive in the specimens vacuum inside electron microscopes. Tissues therefore have to be killed as the first stage in the preparation of them for examination.
Movement can be observed if living material is examined, including the flow of blood, streaming of cytoplasm inside cells and the locomotion of microscopic organisms	No movement can be observed as the material is always dead. Movement can only be deduced indirectly by complex experiments, often involving radioactive tracers.
Colours can be seen - both natural colours and artificial colours caused by staining	Only monochrome images are produced, with black, white and shades of grey
The field of view (the area which can be observed at once) is relatively large - 2 mm across at low power with typical microscopes.	Only a small field of view can be examined at once - in a TEM the maximum uninterrupted view is about 100 μm across
The resolution of light microscopes is relatively poor - about 0.25 μm so the maximum useful magnification is only x 600. Many structures within cells cannot be seen clearly.	The short wavelength of electrons gives very good resolution - about 0.25 nm. This allows magnification of about up to x 500 000. Very small objects therefore become visible including many of the details of cell structure