Microscopes And Electron Micro Essay, Research Paper

Microscopes and Electron Microscopy

There are many different types of microscopes and each of them works in different ways and are used to magnify different things. Some examples of these are light microscopes, transmission electron microscopes and scanning electron microscopes.

Light microscopes, also known as a compound microscope, are the most simple. The condenser focuses light rays, which normally come from a lamp pointed at the mirror. It focuses light onto the object to be viewed. Light travels through the specimen and up to two lenses, one of which forms the image while the other greatly magnifies it so that we are able to see the detail in the specimen. An important part of how the microscope works is the fact that light travels through the specimen. For this to take place, the material must be cut very thinly. The material is then stained so that the different parts of the material are visible. A dye such as methylene blue is used because this dyes the material without killing it. Other dyes require the material to be killed first.

An electron microscope is different to a light microscope. They have played an important part in our knowledge of the cell ultra structure. It shows us the fine details of the cell organelle. Electrons are used to make a magnified image of the cell. Electrons have a much shorter wavelength than light and so therefore it has a great resolving power. Instead of a lamp that was used with a light microscope to generate light an electron gun is used, which are then focused on electromagnets. Areas that are densely filled with electrons produce dark areas so we can clearly see the shape of the cells. The high-density electron beam can destroy parts of the tissue causing lighter parts on the image we see. The image produced is then seen on a screen or photographic plate. The photos of specimens produced are called electonmicrographs. Electron microscopes cannot be used to look at living cells so the disadvantage of this is that the cells have to be killed.

The size of the magnification and the resolution of a microscope determine the size of the image and the detail in which we see the image. Resolution and magnitude are two different things that are explained here. Magnification is the number of times bigger the image we are projected is than the actual material. We can change the magnitude by changing the lens we use to view to specimen. We always start with the lowest magnification and work our way up higher if needed. Magnification can always be increased but the will make the image become more distorted which would not help our viewing of the image. If the resolution on the other hand is increased then the image will be clearer to see. The resolution is the microscopes ability to separate images that are close together. Resolutions are determined by wavelength; a smaller wavelength will produce clearer pictures, therefore electron microscopes produce clearer images as they use electrons rather than light and electrons have short wavelengths and therefore greater resolutions.

Air inside the microscope would destroy the electron beam, as air molecules interrupt the electrons path so the microscope must be under a vacuum, and all water must be removed. This is a difficult procedure as this could change the shape of the structure and give us unrealistic results. One way of combating this difficulty is instantly freezing the specimen in liquid nitrogen. The shape of the specimen is not changed as it is dehydrated. The tissue is broken up and a mask is formed of the tissue, it is coated with a heavy metal to strengthen it. This is called freeze etching and the results are very good.