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RESEARCH ARTICLE

MICROPHOTOGRAPHY- A REVIEW

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Abstract

Microphotographs are useful biology teaching aids. In laboratory activities that require microscope slide preparation, they are an effective tool for pre- and post-lab discussions. They are also useful mechanisms to enhance lectures that deal with the microscopic world.[1]Microphography is useful to generate high quality micrographs with high resolution with a larger field of view, that enable to view the crucial ultrastructure relevant for pathological diagnosis. Incorporation into correlation and multi-modal microscopy workflows will assist with solving problems not only in research but also in specific fields of pathology and medical diagnosis.[2]

Introduction:-

The biological and medical sciences have, for many years, relied heavily on microscopy to solve problems relating to the gross morphological features of specimens as well as a quantitative tool for recording specific optical features and data.[3]

This art has received various names at different times, and when alluded to at the present day is termed micro-photography. This title is a decided misnomer, for that term signifies the reduction of large pictures to microscopic dimensions. Photo-micrography would seem to be a more appropriate term for the process by which photographs of microscopic objects are produced.[4]

Fluorescence Microscopy

Fluorescence is a type of luminescence where light is emitted from molecules for a short period of time following the absorption of light. When the delay between absorption and emission is on the order of **1 0-8** seconds or less, the emitted light is termed fluorescence. If the delay is - seconds it is termed delayed fluorescence, while a delay of greater than - seconds results in phosphorescence. When light interacts with matter, it may be either scattered (diffracted light) or absorbed. Light absorption occurs in discrete amounts termed quanta, The energy in a quantum is given by: E =4v =4c/A where4 is Planck's constant, **c** is the velocity of light in a vacuum, A is the wavelength of light, and v is the frequency of the vibration of light[5]

Confocal Microscopy

A confocal microscope creates sharp images of a specimenthat would otherwise appear blurred when viewedwith a conventional microscope. This is achieved by excluding most of the light from the specimen that isnot from the microscope's focal plane. The image hasless haze and better contrast than that of a conventionalmicroscope andrepresents a thin cross-sectionof the specimen. Thus, apart from allowing better observation of fine details it is possible to buildthree-dimensional (3D) reconstructions of a volumeof the specimen by assembling a series of thin slicestaken along the vertical axis.[6]

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Transmission Electron Microscopy (TEM)

TEM works in the following mechanisn : Electron beams, generated from an electron gun, could be closely focused by metal apertures and electromagnetic lens in the column of a TEM. The mechanism of the focusing phenomenon of electrons is based on the wavelike character of electrons as they behave as negatively charged particles, then deflected by magnetic or electric fields. The applications of this character of electrons have also been broadly applied in the modern electrical device, such as computer screens, TV display tubes, and cathode-ray tubes.[7] During this procedure, electrons only within a small range of energy could pass through, leading to a welldefined energy electron beam. Then, the transmitted electrons are applied to the specimen in the column of a TEM, which is placed onto the sample holder (or called TEM grid, consisting of metal frame and carbon-based film) equipped with a mechanical arm for controlling the position and holding the specimen. The thickness of a TEM specimen usually should be within 100 nm for electrons to pass through. Many factors of the specimens could have an impact on the transmission of electron beam, such as density or composition of a specimen[8]

The TEM technique has been applied to investigate the fine structure and elemental information of specimens. It offers ultrahigh resolution compared to light microscope. For characterizing membrane-based materials, TEM provides nanoscale images of membranes and its building blocks. Cross-sections and tomography of membrane film can be obtained, although thin samples have to be carefully prepared. The method can be highly valuable for better understanding of membrane formation mechanisms, material structureeperformance relationship, and membrane fouling measures[9]

Scanning Electron Microscopy (SEM)

The most recent evolution of SEM is the process of generating the images digitally. Followed by displaying the images on computer screen. The majority of available commercial SEMs are equipped with (EDS) system and modern software to analyse the received data . The EDS added the advantages of evaluating the composition of various elements in the sample with the aid of computer program. The latter facilitate the whole operation process; it converts the intensity of x-ray ratio to chemical compositions in a few seconds besides increasing quantitative analysis performance[10]

Conclusion:-

Microphotography is an art, and in order to capture the highest-quality pictures it is necessary to understand the obstacles that will be encountered and how to overcome them. The photographer must achieve the perfect balance between the microscope and camera in order to get the desired results

This has positively contributed to the enhancement of quality of life since a lot of discoveries directly contributed to the development of drugs and cures used in the treatment of diseases and conditions that were previously misunderstood or not well understood.

A cell is the single unit of life, and to understand and study it, a microscope is necessary. The discovery of cells and genes was major milestones in the medical sciences and was a great influence on the development of new effective cures and a reduction of mortality cases among populations.

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