Writing assignment #2

Polarization Microscopy – Dr. Salmon Lecture

Polarized microscopy is a very useful type of light microscopy that helps us to observe submicroscopic structures of biological specimens, minerals, and fiber. Dr.Salmon discusses the polarization microcopy focusing on mitotic spindle birefringence. In polarizing microscopy, we are using polarized light to illuminate the sample being observed meaning we are converting unpolarized light to plane polarized light. The orator provides an example of tungsten filaments that has many molecular oscillators that emit light with different orientations therefore creating an unpolarized light. However, vibration of electromagnetic waves of light occurs in a single plane in polarized light. Dr.Salmon mentions laser which emits polarized light from coherent sources within the laser. For proper usage of polarization microscopy, components of the microscope and type of sample is very important.

Use the first paragraph to introduce the subject of the entire paper. This requires making decisions on what will be discussed later in the paper. Also, it requires that you think hard about deciding what is most important to the entire discussion. For example, how important is it to provide brief descriptions of tungsten vs laser illumination?

Compare to other microscopes, components of polarizing microscope differ with it including green filter, polarizer, and analyzer constituents. Be careful – any microscope can use a green filter. Did you forget that DIC uses polarized light? Green filter is used to illuminate the specimen with monochromatic light at the wavelength that not damaging the specimen. Polarizer is used to convert unpolarized light to plane polarized. Analyzer analyzes the spectrum and the image and is also a polarizer which cancels the light that comes from the polarizer at the background of the microscope by having vibration transmission direction at 90 degrees to it. This last sentence contains too many thoughts. Carefully consider the function of the analyzer. Polarizing microscope also has condenser and objective lens used for normal Koehler illumination. All microscopes have these components. There is also a rotational stage used to rotate the sample relative to the polarizer transmission azimuth making contrast of the image be dependable on it. Birefringent compensator is used to control the background illumination. It is also used to improve the phase contrast of specimens that has weak birefringence.

The way you organized and wrote the paragraph makes it seem that you don’t have an understanding of light microscopy. This happens because you attribute certain components to pol scopes when, in fact, they are components of all microscopes.

The specimen type is critical for polarization microscopy. In the comparison of images of sea urchin’s embryo, on phase contrast, the ribosomal aggregates as of being isotropic in their refractive index are not detected on polarized microscope whereas spindle fibers are anisotropic which make them polarized. Specimens with structure like crystals, a thick medium (larger refractive index), and anisotropy structure are called birefringence substances. This past sentence makes it seem that you do not understand birefringence. Microtubules in spindle fibers positioned linearly mainly in the axial direction of the central spindle and horizontally at 90 degrees to central spindle. Refractive index for light vibrating in axial direction is larger than for horizontally directed fiber in metaphase. This makes spindle and astral fibers birefringent and detectable in polarized microscopy. However, the astral fibers in perpendicular direction to axial spindle are darker because of birefringent compensator. Therefore, optical anisotropy is useful in the optical analysis of birefringent specimens.

The paragraph lacks organization and focus. What are you trying to say? It might be valuable to define some of your terms and then use those definitions to demonstrate an understanding of the methods and their application. Also, remember the Fishknd and Wang paper relied upon similar principles.

Specimen birefringence introduces relative retardation where there is a path difference between ordinary and extraordinary rays refracted by anisotropic crystals. Both reflected and refracted rays will interfere in 90-degree angle to one another, so the reflected light gets polarized. In this case, the direction of vibration of an electrical field will be parallel to the plane of interface.

Why is this last paragraph important. Again, you introduce new terms but don’t state the importance of the term to either pol microscopy or the spindle.

In conclusion, polarized microscope provides an information of an absorbed color and optical path boundaries between isotropic and anisotropic specimens. Using polarization microscopy, we can now see images which we could not see previously. This technique is critically dependent on the use polaroid which is a component for polarization, polarizer, analyzer, and birefringent specimens. We can also quantitatively and qualitatively observe the changes in the specimens from the retardation of the images.

Grade 7/10: Please give greater thought to:

-- improving organization

-- considering a single focus of discussion per paragraph

-- try to establish that you understand the imaging and how it allows investigation in cell biology.