

## MICROTECHNIQUE LITERATURE SEMINAR - CATALYST QUESTIONS

### A. ELECTROLYTES AND PLASMA EXPANDERS

1. Define electrolyte and plasma expander.
2. What is "normal" about "normal saline"?
3. Cite three purposes of a balanced salt solution.
4. What type of substance must supplement a balanced salt solution if cells are to remain viable for several hours?
5. How does viability influence morphology, if at all?
6. What are lysosomes? Why are they important?

### B. PROBLEMS OF FIXATION IN CYTOLOGY, HISTOLOGY, AND HISTOCHEMISTRY

1. What is the difference between a preservative and a fixative?
2. Cite four primary purposes of a fixative.
3. Would you expect to see differences in staining between cells fixed in 10 percent formalin and 95 percent ethyl alcohol? Why?
4. Describe the Papanicolaou stained appearance of cells from the same population fixed in formalin and fixed in ethyl alcohol.
5. If 95 percent ethyl alcohol does not "fix" nucleoprotein, what is responsible for the "sharp, jagged, angular chromatin clumps" in malignant cells?
6. Relative to other fixatives, how much does ethanol harden tissues and how fast does it penetrate them (qualitatively speaking)?

### C. EXPERIMENTS ON THE ACTION OF MORDANTS

1. Harris' hematoxylin is preferred by many workers. Do you know its composition? Is it an empirically (oversight) or theoretically designed stain? Why do commercial suppliers like it?
2. What is responsible for the reflecting metallic scum or precipitate which forms on the surface of hematoxylin solutions on standing?
3. How much sodium iodate is required to oxidize one gm of hematoxylin?
4. Define the following: mordant, lake, regressive staining, progressive staining, differentiation, and blueing.
5. How many molecules in 2 gm of hematoxylin (M.W. = 356.32)?
6. How great is the dye content range of commercial hematoxylin?

### D. FACTORS WHICH CONTROL THE STAINING OF TISSUE SECTIONS WITH ACID AND BASIC DYES

1. Define the following terms: ampholyte, acid dye, basic dye, anion, cation, pH, law of mass action, and isoelectric point?
2. How many different amino acids are known to exist? How many are capable of ionization? Which amino acids are they? What electric charge do they carry?
3. What dyes are in the Papanicolaou stain? Which are acid dyes and which are basic dyes?
4. What reasons can be given for the use of alcoholic (as opposed to aqueous) counterstains in the Papanicolaou stain?
5. Papanicolaou's original formula for his EA solutions contained three dyes; why do some cells take up one dye, and other cells, some other dye?
6. What effect on staining occurs when acetic acid is added to the two Papanicolaou counterstains? How does it occur?

E. THE SPECIFICATION OF A STANDARD MICROSCOPE COVER-GLASS

1. Define the following: refraction, refractive index, and dispersion.
2. Cite the three quantitative specifications and their tolerance limits for a cover-glass.
3. Under what assumptions are the measurements in Question No. 2 made?
4. Given the values for  $N$ ,  $N_1$ , and  $\lambda$  on page 71, substitute values of 0.25, 0.66, and 1.25 for NA in order to determine the permissible change of thickness in Equation(3) on p.70. If you can, calculate the  $\delta d$ . Why were these three NA's chosen?