Staining

Stains react in two general ways: 1) They combined directly with the tissue, or 2) they require that the tissues be treated first with an anchoring substance or mordant. Very few stains can be relied upon to color with the desired selectivity or intensity unless carefully controlled. This may be accomplished by stopping at the desired intensity or removing excess with another reagent.

Selective stains have been found for many of the different parts of the cell and for characteristic elements in the tissues. Much of the selective action is due to the fixation and previous treatment as well as to the subsequent staining and differentiation.

Impregnation is not really a staining process but it is considered as one of the staining methods. The tissues are first placed in a solution of the salt of a heavy metal. The metal is precipitated as a black deposit about certain structures. These stains are especially used for study of neurons and glia of the central nervous system.

Basic and Acid Dyes

Basic dyes are cationic. They form salts with cationic groups in cells and tissues, particularly the ionized amino groups of proteins. Acidophilic or oxyphilic is applied to parts, which show a greater affinity for acid dyes. The cytoplasm is usually acidophilic. Eosinophilic components are cationic compounds that have an affinity for that acid dye.

Acid dyes are anionic. They form salts with cationic groups in cells and tissues, particularly the ionized amino groups of nucleic acids and the sulfate groups of the glycosaminoglycans. Basophilic is the term used to designate the components of a cell or tissue, which take up the basic stain rather than the acid stain of a combination. Nuclei are basophilic.

Following are some terms related to dyes:

Mordants - A mordanting substance is considered part of the stain, and in this way it may change the reaction of the stain. For example, hematoxylin is an acid, but as it is almost always used in conjunction with alum or iron (the mordant) it becomes a basic stain.

Amphophilic - It is a term used to indicate that the tissue stains with both the basic and the acidic dyes.

Neutrophilic - No special affinity for either the basic or acidic components of a dye.

Metachromasia - It refers to the production of a color during staining which is different from the original color of the staining solution. Mast cell granules will stain a reddish-purple with toluidine blue. Metachromasia is pH dependent. Many substances are only metachromatic when stained as frozen sections. Usually they must be viewed immediately, if not sooner.

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