THE CYTOPLASM

The cytoplasm is the section of the cell that is bounded by the plasma membrane. It has the following structures: cytosol and organelles.

Cytosol (or Matrix)

The cytosol is a colloidal organic fluid that is bounded by the plasma membrane. The cytosol is the aqueous portion of the cytoplasm (the protoplasm outside the nucleus) and of the nucleoplasm (the nuclear protoplasm). It fills all the spaces of the cell and constitutes its true internal milieu. Cytosol is particularly rich in differentiating cells. The fundamental properties of cells are (or exist) because of the cytosol.

The cytosol serves to dissolve or suspend the great variety of small molecules concerned with cellular metabolism, e.g. glucose, amino acids, nucleotides, vitamins, minerals, oxygen and ions. In all types of cells, cytosol contains the soluble proteins and enzymes which form 20 to 25 percent

of the total protein content of the cell. Among the important soluble enzymes present in the matrix are those involved in glycolysis and in the activation of amino acids for the protein synthesis. In many types of cells, the cytosol is differentiated into 2 parts: ectoplasm, the layer which is viscous, rigid and non-granular; endoplasm, the layer that is located in the inner portion of the cytoplasm and it is granular and less viscous.

The cytosol also contains fibres that help to maintain cell shape and mobility and that probably provides anchoring points for the other cellular structures (organelles). Collectively, these fibres are termed cytoskeleton. At least three (3) general classes of such fibres have been identified: microtubules, microfilaments (or actin-filaments) and intermediate filaments (IF).

Organelles

Organelles are the living structures in a cell and are membrane bound in cytosol. The other non-living

structure are called paraplasm or inclusion, (e.g. oil drops, triacylglycerol, yolk granules, secretory granules and starch grains).

Organelles literally mean tiny organs. Organelles are structures of membranes closed off at specific regions of the eukaryotic cells performing specialized tasks: oxidative phosphorylation and generation of energy in the form of ATP molecules (in mitochondria); formation and storage of carbohydrate (in plastids); protein synthesis (in rough endoplasmic reticulum); lipid (and hormone) synthesis (in smooth endoplasmic reticulum); secretion (by Golgi apparatus); degradation of macromolecules (in the lysosomes); regulation of all cellular activities (by nucleus); organization of spindle apparatus (by centrosomes) and so forth. Membrane-bound enzymes catalyse reaction that would have occurred with difficulty in an aqueous environment (i.e. the cytosol).

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