Definition of Peroxisome

* Peroxisomes are small, membrane-enclosed cellular organelles containing oxidative enzymes that are involved in a variety of metabolic reactions, including several aspects of energy metabolism.
* They are considered as an important type of microbody found in both plants and animal cells.
* They were identified as organelles by Belgian cytologist Christian de Duve in 1967 after already been described.
* First peroxisomes to be discovered were isolated from leaf homogenate of spinach.
* They are most abundantly found in detoxifying organs such as the liver and kidney cells. However, they can be induced to proliferate in response to metabolic needs.

Structure of Peroxisome

* They are membrane-bound spherical bodies of 0.2 to 1.5 μm in diameter found in all eukaryotic organisms including both plants and animal cells.
* They are found floating freely in the cytoplasm in close association of ER, mitochondria or chloroplast within the cell.
* They are among the simplest of eukaryotic organelles.
* They exist either in the form of a network of interconnected tubules called peroxisome reticulum or as individual microperoxisomes.
* They are variable in size and shape according to the cell and usually circular in cross-section.
* They range from 0.2 -1.5 μm in diameter.
* It consists of a single limiting membrane of lipid and protein molecules enclosing the granular matrix.
* The matrix consists of fibrils or a crystalloid structure containing enzymes.

**Peroxisomal Enzymes**

* Approximately 60 known enzymes are present in the matrix of peroxisomes.
* They are responsible to carry out oxidation reactions leading to the production of hydrogen peroxide.
* The main groups of enzymes include:
1. Urate oxidase
2. D-amino acid oxidase
3. Catalase

**Functions of Peroxisomes**

1. **Hydrogen Peroxide Metabolism:**
* Enzymes present in the peroxisomes both lead to the production and elimination of H202 which is a reactive oxygen species.
1. **Fatty acid oxidation:**
* Oxidation of fatty acids, in animal cells, occurs in both peroxisomes and mitochondria, but in yeasts and plants, only limited to peroxisomes.
* Oxidation is accompanied by the production of H202 which is decomposed by [**catalase**](https://microbenotes.com/catalase-test-principle-procedure-and-result-interpretation/) enzyme. This provides a major source of metabolic energy.
1. **Lipid biosynthesis**
* Synthesis of cholesterol and dolichol occurs in both ER and peroxisomes. Bile acid synthesis takes place from cholesterol in the liver.
* Peroxisomes contain enzymes to synthesize plasmalogens, a family of phospholipids which are important membrane components of tissues of the heart and brain.

