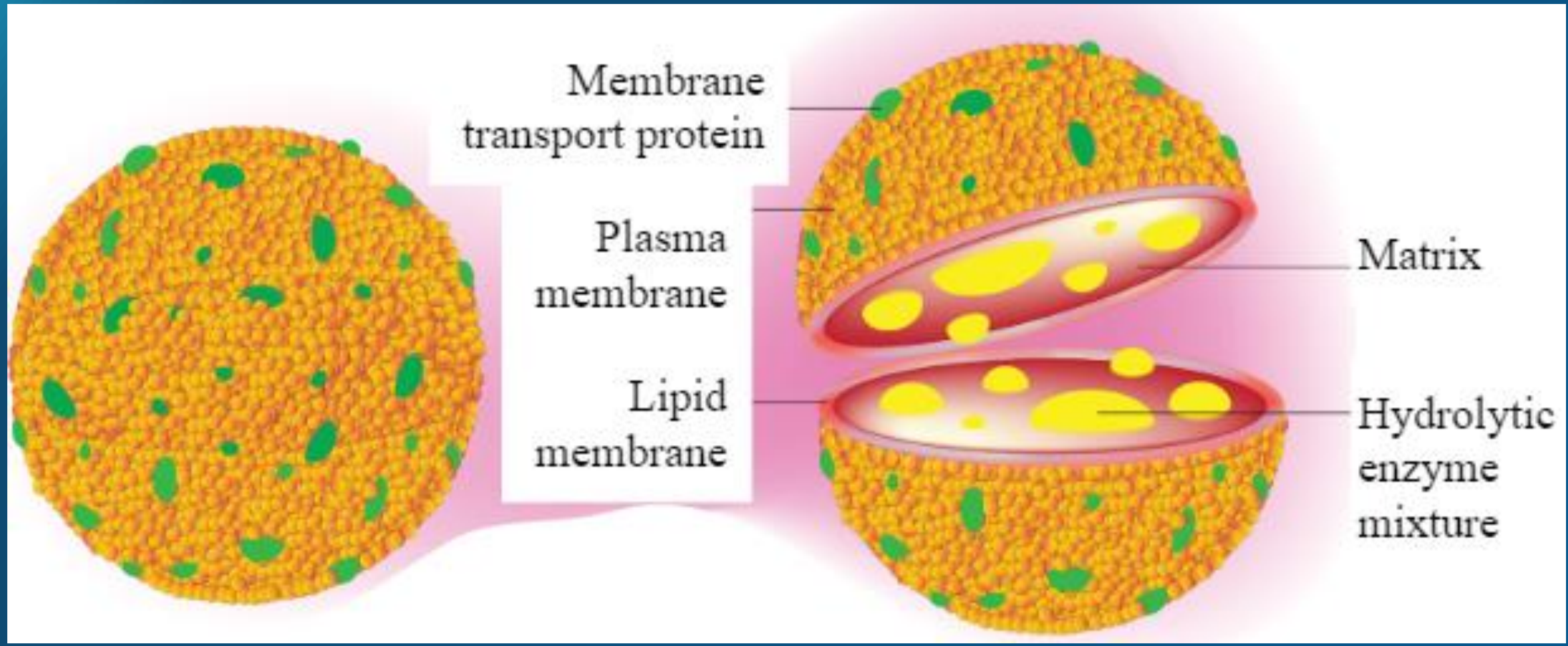
MICROBODIES

GLYOXYSOMES AND PEROXISOMES



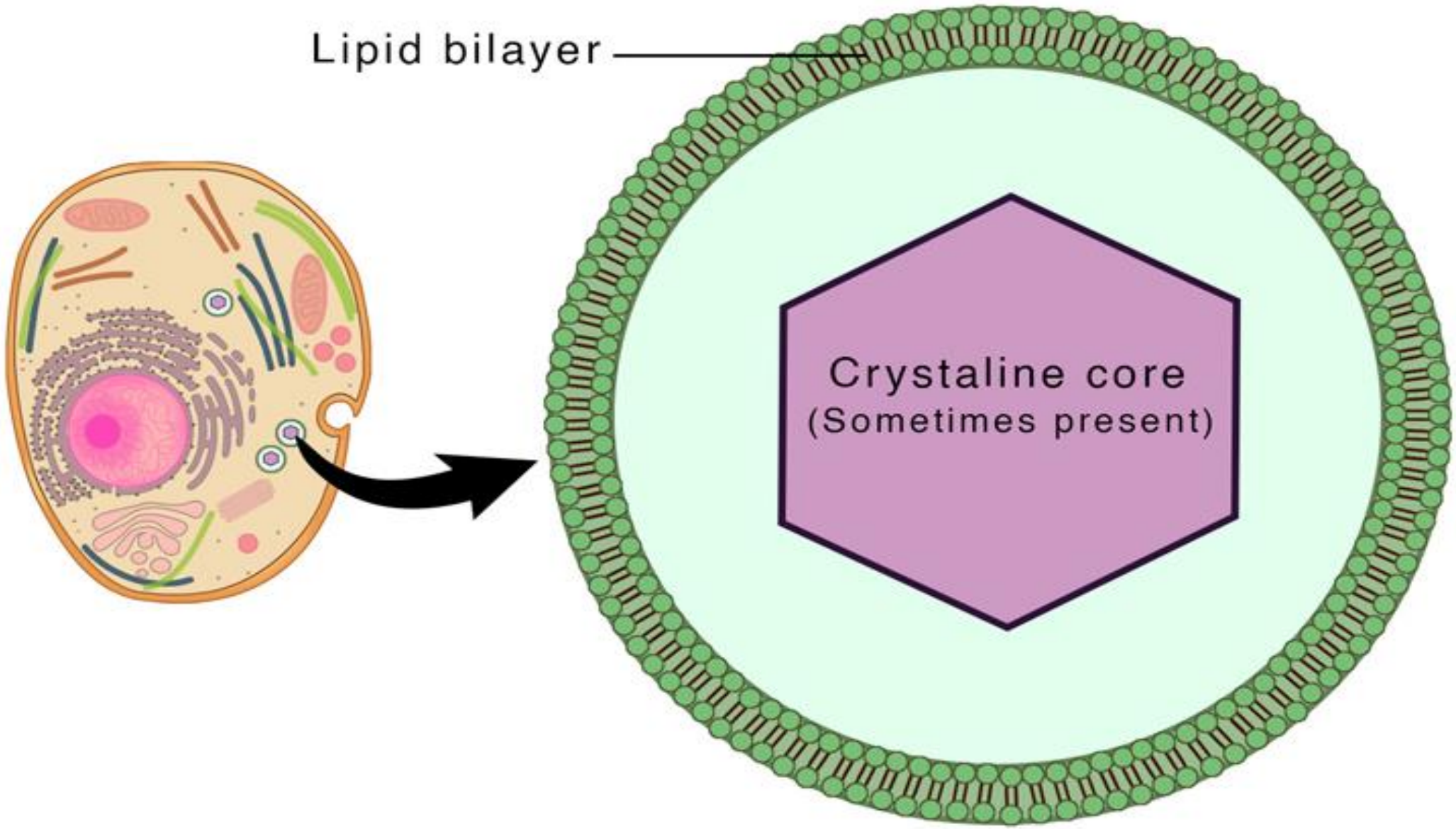
Microbodies

- Glyoxysomes and peroxisomes are specialized organelles found in eukaryotic cells, and they play important roles in cellular metabolism, particularly in the detoxification of reactive oxygen species and lipid metabolism.

Peroxisome

- **Structure**
- Peroxisomes are small, membrane-bound organelles present in virtually all eukaryotic cells. They are involved in various metabolic processes, especially those involving hydrogen peroxide.
- **Key Features:**
- **Single membrane:** Enclosed by a single lipid bilayer membrane.
- **Enzyme content:** Contain enzymes like catalase and oxidases which are crucial for their metabolic functions.

Peroxisome



Peroxisome

- **Functions**
- **Hydrogen Peroxide Decomposition:** Peroxisomes contain catalase, which decomposes hydrogen peroxide (H_2O_2) into water (H_2O) and oxygen (O_2). This is vital for protecting the cell from oxidative damage.
- **Detoxification:** Other enzymes in peroxisomes, such as superoxide dismutase, also play roles in detoxifying harmful substances in cell.

Peroxisome

- **Lipid Metabolism:**
- Peroxisomes are responsible for the beta-oxidation of very long chain fatty acids, which cannot be processed by mitochondria.
- **Plasmalogen Synthesis:**
- Peroxisomes are involved in the biosynthesis of plasmalogens, a type of phospholipid critical for the normal function of the brain and lungs.

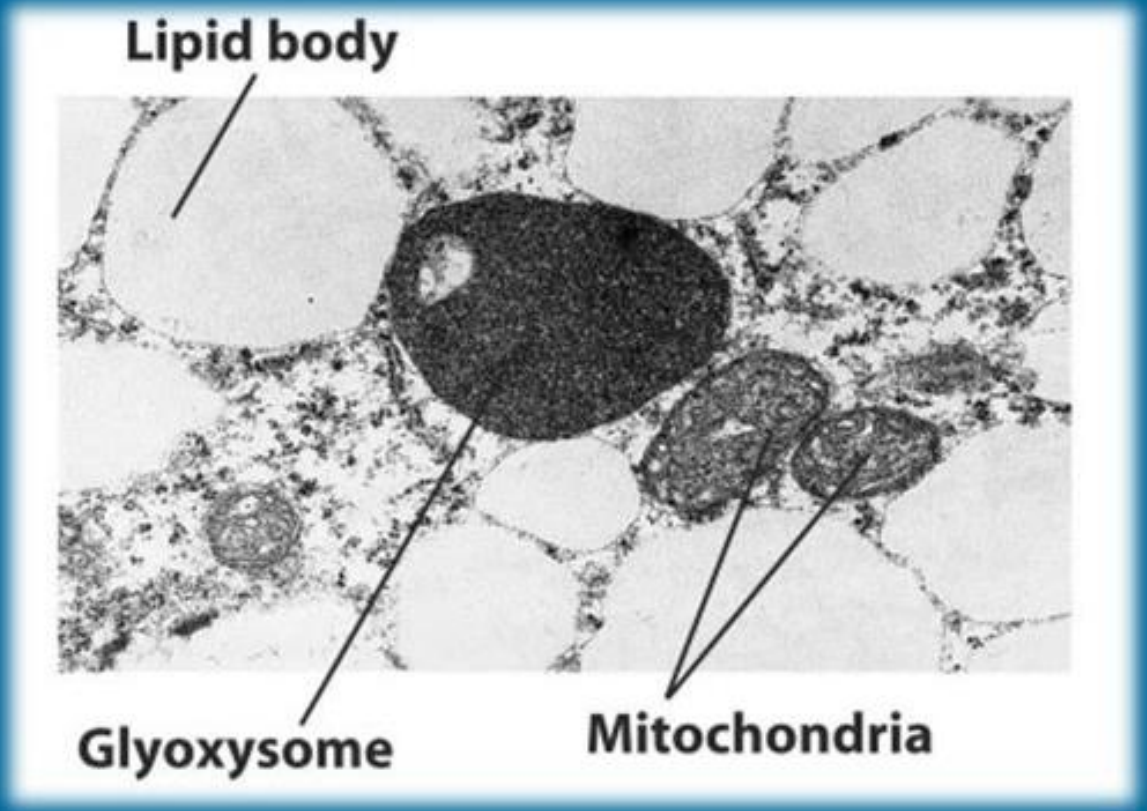
Peroxisome

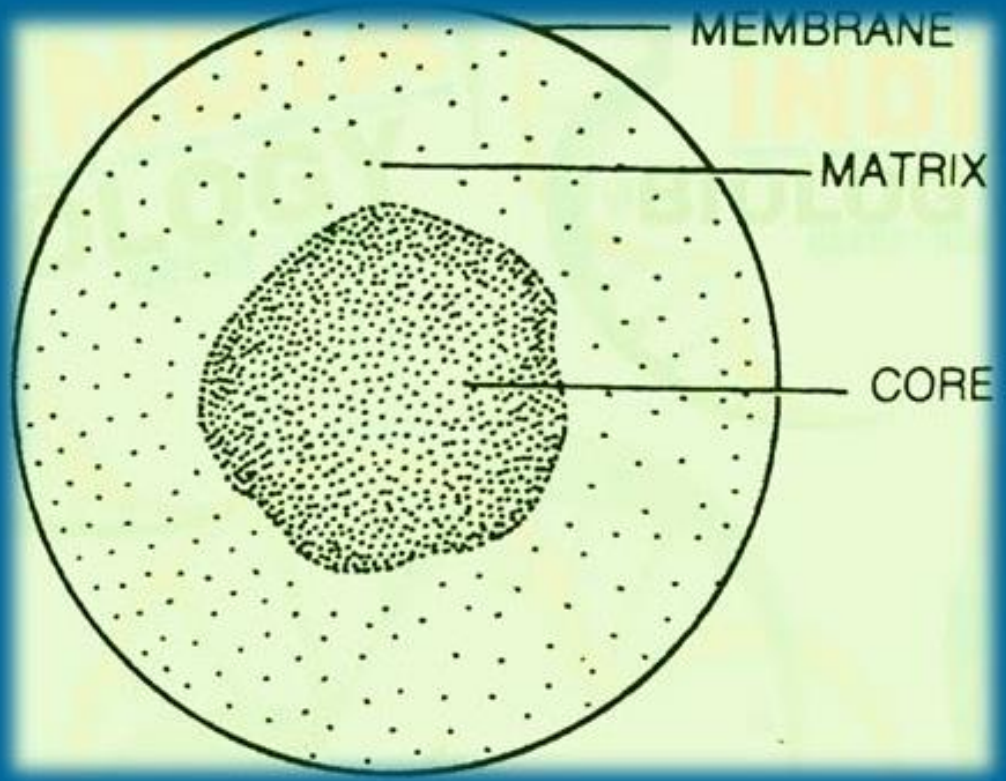
- **Biosynthesis of Bile Acids:**
- Peroxisomes contribute to the synthesis of bile acids from cholesterol, which is essential for the digestion and absorption of dietary fats.
- **Glyoxylate Detoxification:**
- Peroxisomes convert glyoxylate to glycine, preventing the accumulation of toxic levels of glyoxylate in cells.

Glyoxysomes

- **Structure**
- Glyoxysomes are a type of peroxisome found predominantly in plant cells and some fungi. They are membrane-bound organelles that contain enzymes specific to the glyoxylate cycle, which is a variation of the citric acid cycle.
- **Key Features:**
- **Single membrane:** Like other peroxisomes, glyoxysomes are surrounded by a single lipid bilayer membrane.
- **Enzyme content:** They contain enzymes such as isocitrate lyase and malate synthase, which are crucial for the glyoxylate cycle.

GLYOXYSOMES





Glyoxysomes

- **Functions**
- **Glyoxylate Cycle:**
- **Conversion of Fatty Acids to Carbohydrates:** The primary function of glyoxysomes is to convert fatty acids into carbohydrates through the glyoxylate cycle. This is especially important in germinating seeds, which rely on stored lipids to produce the sugars necessary for growth until they can photosynthesize.
- **Bypassing the CO_2 Producing Steps:** The glyoxylate cycle bypasses the decarboxylation steps of the citric acid cycle, thus preventing the loss of carbon as CO_2 and facilitating the conversion of acetyl-CoA into four-carbon compounds.

Glyoxysomes

- **Beta-Oxidation of Fatty Acids:**
- **Fatty Acid Breakdown:** Glyoxysomes contain enzymes for the beta-oxidation pathway, which breaks down fatty acids to produce acetyl-CoA. This acetyl-CoA then enters the glyoxylate cycle.
- **Interaction with Other Organelles:**
- **Collaboration with Mitochondria:** Glyoxysomes work in conjunction with mitochondria to fully metabolize fatty acids and facilitate the energy production required for various cellular activities.

THE END