PEROXISOMES

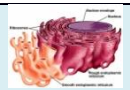
- Peroxisomes & vacuoles are not part of endomembrane sys.
- **Membrane-bound** vesicles that contain specific enzymes (synthesized by free ribosomes).
- **Enzymes** result in production of hydrogen peroxide (H_2O_2) which is broken down: $H_2O_2 \rightarrow H_2O + ½\ O_2$ by **catalase.**
- **Prevalent** in cells synthesizing & breaking down lipids (e.g. liver cells: produce bile salts from cholesterol & break down fats).
- In **germinating seeds:** convert oils into sugars used as nutrients by the growing plant.
- In **leaves**: carry on reactions opposite to photosynthesis.

ENDOMEMBRANE SYSTEM

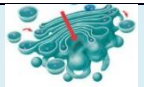
- Series of **intracellular membranes** – nuclear envelope, membranes of ER, Golgi apparatus & several types of vesicles - that compartmentalize cell.
- Summary:
  - **Proteins** produced rough ER & lipids from smooth ER are carried in vesicles to the Golgi apparatus.
  - **Golgi apparatus** modifies proteins & then sorts & packages them into vesicles.
  - **Secretory vesicles** carry products to membrane where exocytosis produces secretions.
  - **Lysosomes** fuse w/ vesicles & digest macro-mol.

ENDOPLASMIC RETICULUM

- System of **membrane channels** & saccules (flattened vesicles). Continuous with outer membrane of nuclear envelope.
- **Rough ER**
  - Attached ribosomes.
  - Site of **proteins synthesis**; enter lumen of ER for processing & modification (e.g. carbohydrate chains added to protein to form glycoproteins).
  - Both rER & sER form **transport vesicles** – to plasma membrane (secretion) or to other parts of cell (e.g. Golgi apparatus).
- **Smooth ER**
  - Continuous with rough ER but lacks ribosomes.
  - **Lipid synthesis** (in gland cells).
  - Site of detoxification (of drugs in liver) & storage.
  - In **testes**: produce testosterone.



THE ENDOMEMBRANE SYSTEM



VACUOLES

- Large membranous sacs.
- **Contractile vacuoles** in some protists remove excess H_2O. **Digestive vacuoles** digest nutrients.
- **Storage vacuoles:** e.g. plant vacuoles contain H_2O, sugars, salts, pigments & toxic molecules.
- **Central vacuole** maintains turgor pressure within cell, stores nutrients + wastes; digestive enzymes degrade organelles as cell ages.

LYSOSOMES

- **Membrane bound** vesicle produced by G.A
- Contain powerful digestive **enzymes**; are highly acidic.
- **Macromolecules** enter cell as vesicles through plasma mem.; lysosomes fuse w/ & digest vesicle contents.
- **WBC** (macrophage) that engulf bacteria fuse w/ lysosomes to digest bacteria.
- **Autodigestion***:* when lysosomes digest parts of cells.

GOLGI APPARATUS

- Consists of stack of slightly curved saccules.
- **2 faces**: inner (directed towards ER) & outer (directed towards plasma membrane).
- **Receives** protein-filled vesicles that bud from rER & lipid-filled vesicles from sER; sorts & packages pr. & lip
- **Enzymes** within G.A modify carbohydrates attached to proteins in ER.
- **Exocytosis**, or stay as part of cell (e.g. lysosomes).