

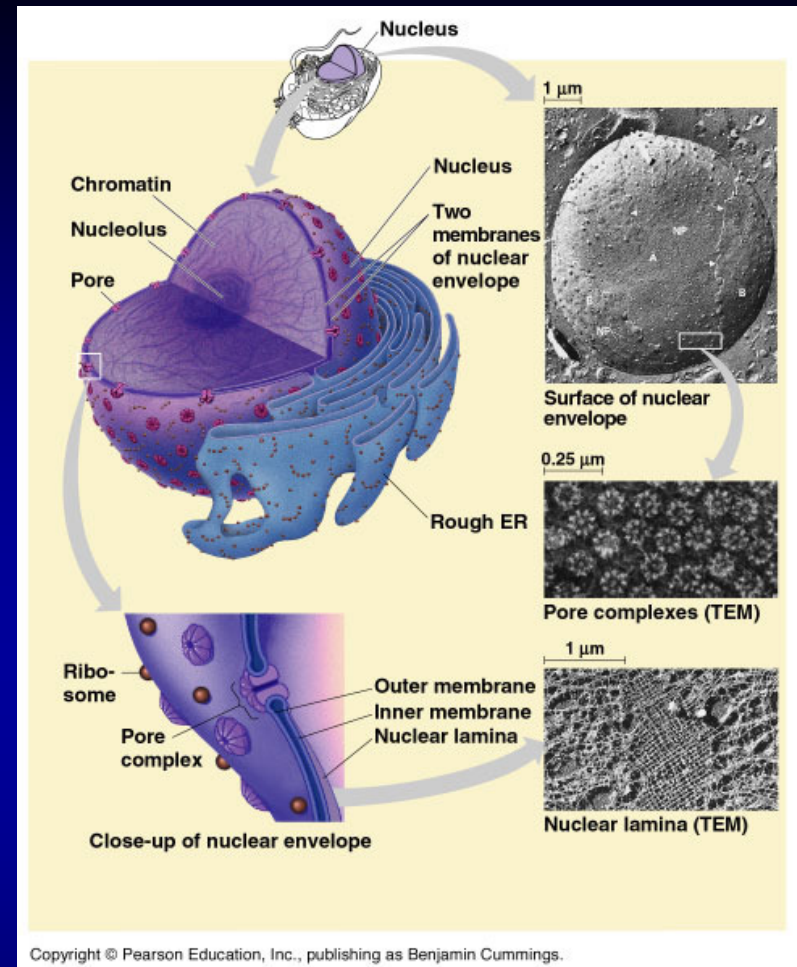
Cell Organelles

Brought to you by 5th Hour
AP Biology 2011

The Nucleus!!!!!!

The nucleus has a spherical shape and contains chromatin and the nucleolus. The nucleus houses genetic material, including DNA.

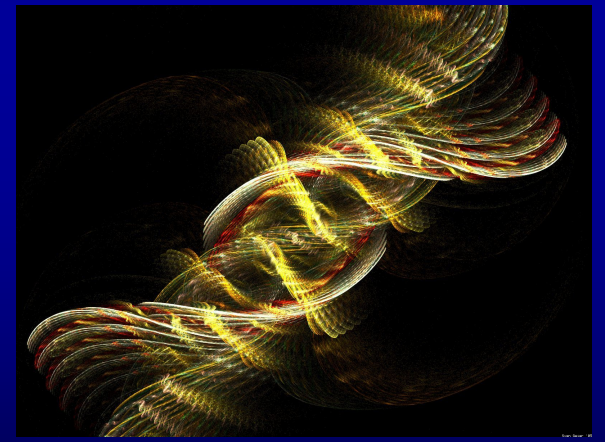
It is surrounded by a Nuclear Envelope which is two different lipid bilayers. There are pores on the membrane to regulate the entry and exit of large macromolecules and particles.



Function

The main function of the nucleus is to direct protein synthesis by making mRNA (translation) and sending it into the cytoplasm.

Also, the nucleus houses DNA and proteins.



Analogy

The nucleus is to the cell as Michael Scott is to the Dunder Mifflin Paper Company (The Office).



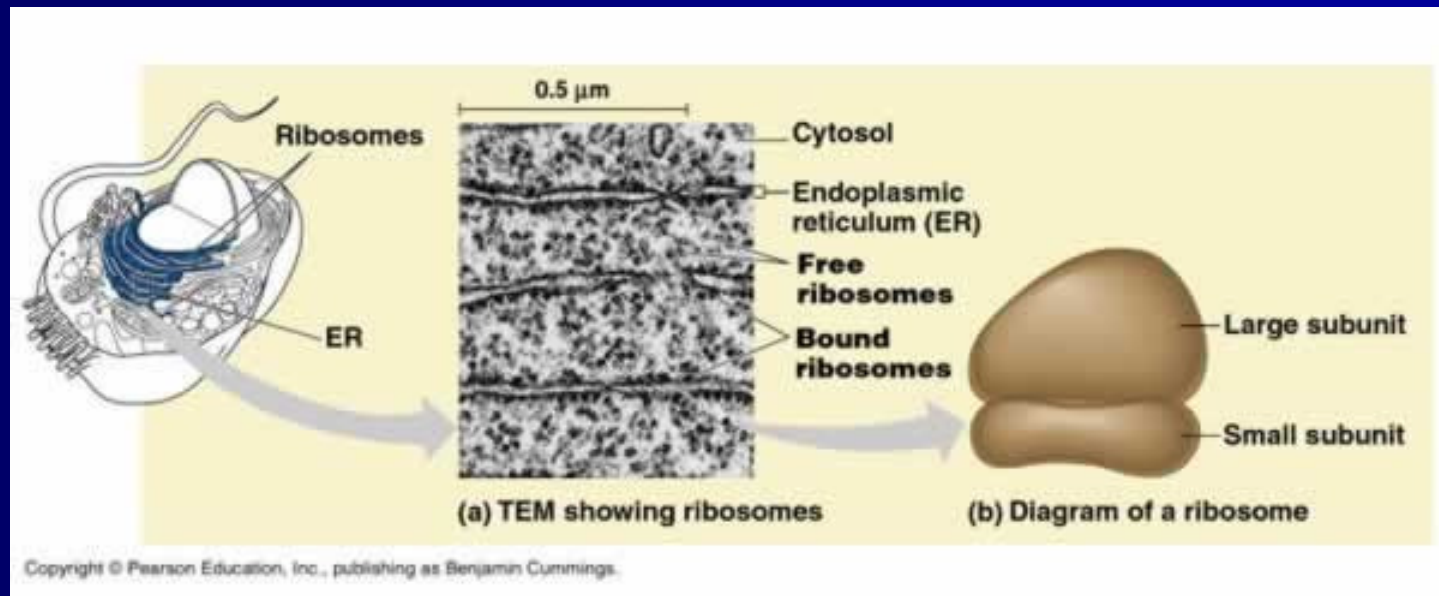
Ribosomes

Natalie Nogoy

Angie Dembowski

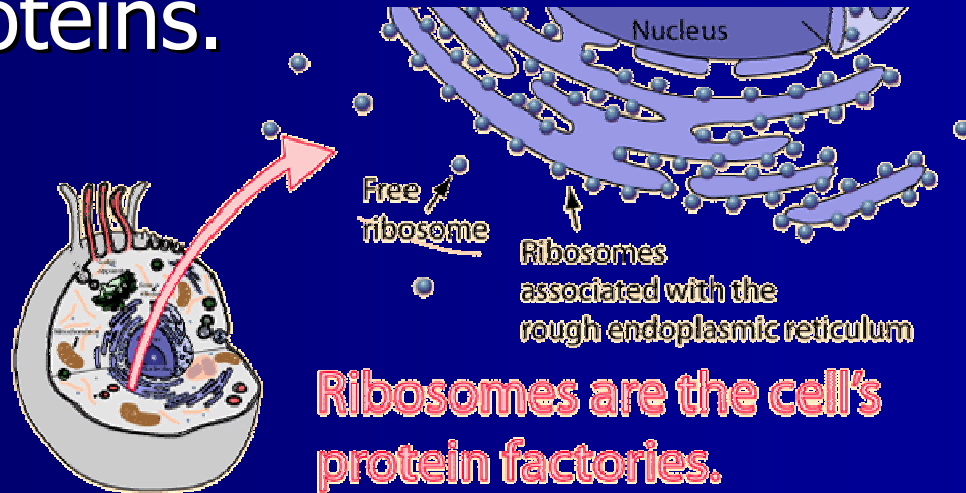
Structure

- Composed of proteins and rRNA.
- Bound: Located on the rough E.R.
- Free: Floating in the cytosol



Function

- Protein builders
- Site of protein synthesis
- Receives messages from mRNA to make proteins.



Analogy

- Ribosomes are like little construction workers. Their boss (DNA) gives the blueprints to the ribosomes via mRNA. Ribosomes read the blueprints and then build the proteins.

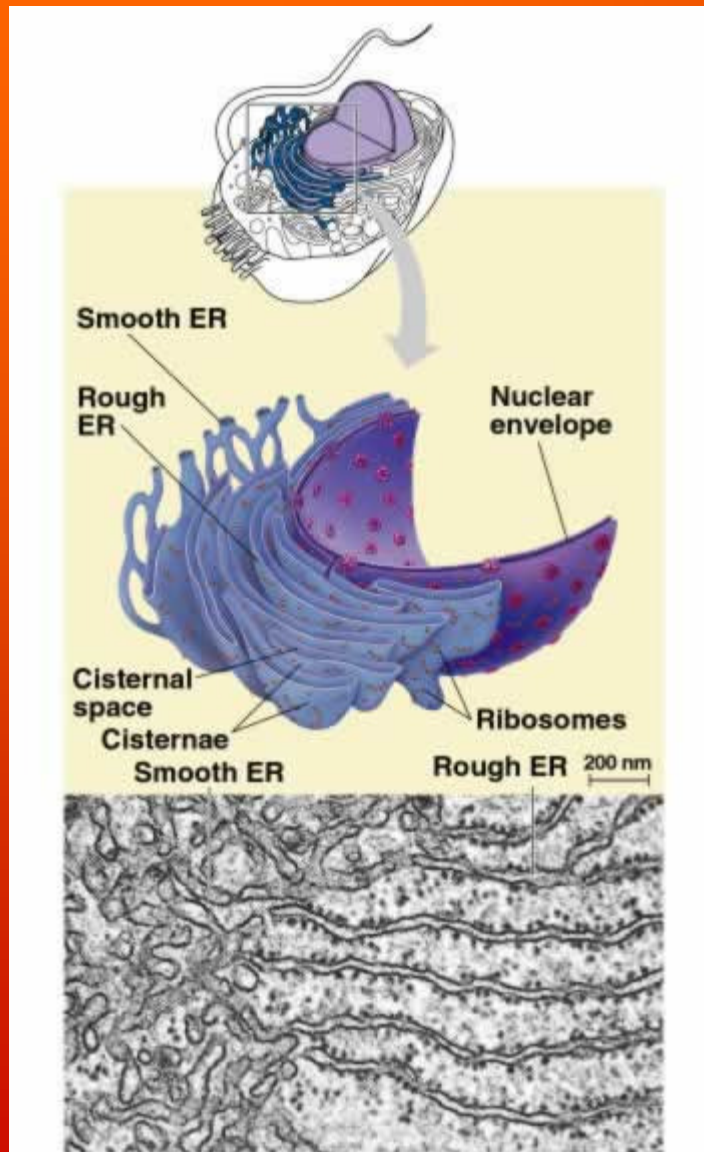


Endoplasmic Reticulum

Caitie Helm and Sabrina Puvalowski



Structure



- A tangle of membranous connected tubules and flattened sacs called cisternae
- Rough ER has ribosomes on its cytoplasmic surface.
- Smooth ER does not.
- Membrane of the ER separates the cisternal space (inside of ER) from the cytoplasm (outside ER).

Function

- **Smooth ER - synthesis of lipids (oils, phospholipids, and steroids like sex hormones), metabolism of carbohydrates, and detoxification of drugs and poisons.**
- **Rough ER – makes secretory proteins. Most are glycoproteins (proteins that covalently bond to carbs), makes its own membrane phospholipids and Lysosome and Golgi Apparatus membrane phospholipids too.**
 - **These secretory proteins are wrapped up in transport vesicles and depart from the Transitional ER (a special part of the Rough ER) to go to other parts of the cell.**

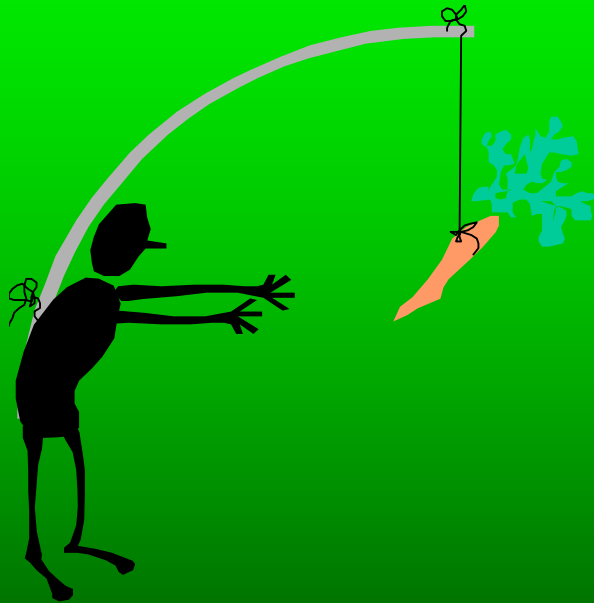


Analogy

- **The ER is like a factory. Objects are made (like the synthesis of lipids & secretory proteins) and the factory is cleaned (detoxifying cells). Then objects are shipped out to be used.**

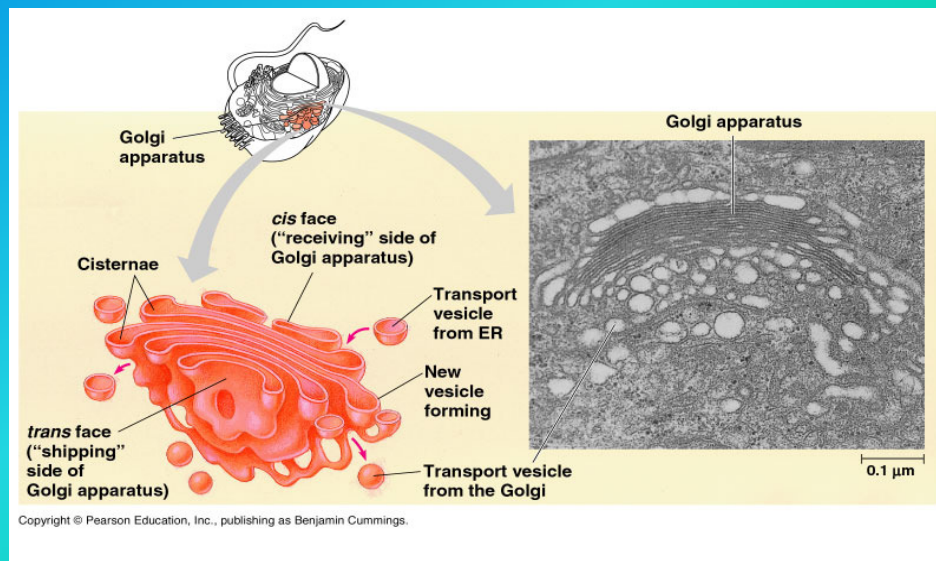


Golgi Apparatus



By: Adam DeRubeis and Kyle Carmack

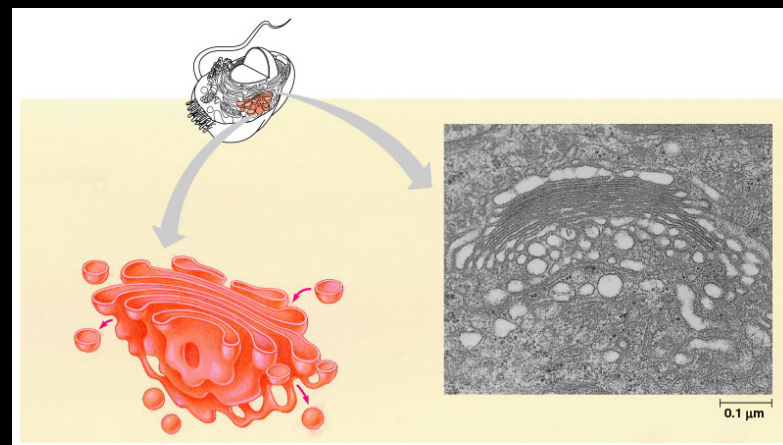
Structure



- The Golgi apparatus has a structure that is made up of cisternae, which are flattened stacks of membrane usually found in a series of five to eight. These cisternae help proteins travel from different points in the cell using enzymes.

Function

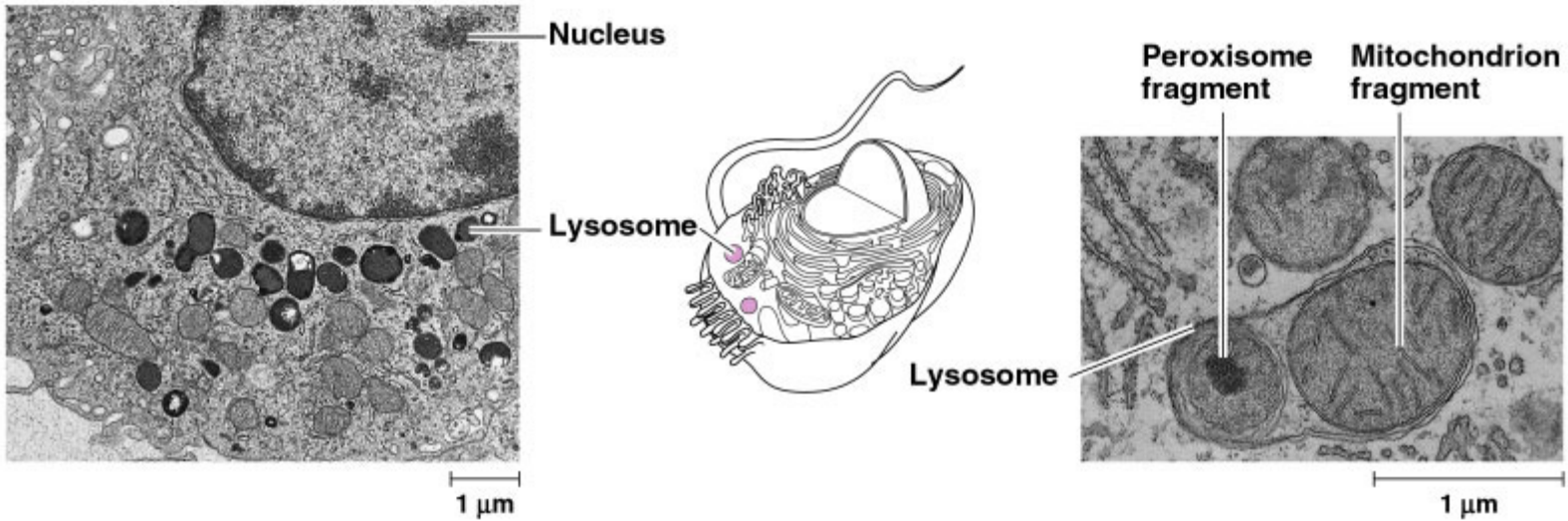
- **The function of the Golgi apparatus is to modify, sort, and package proteins and other materials from the endoplasmic reticulum for storage in the cell or secretion outside the cell.**



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Analogy

- You can think of the golgi apparatus as an airport baggage area that sorts and ships luggage to the place it needs to be.

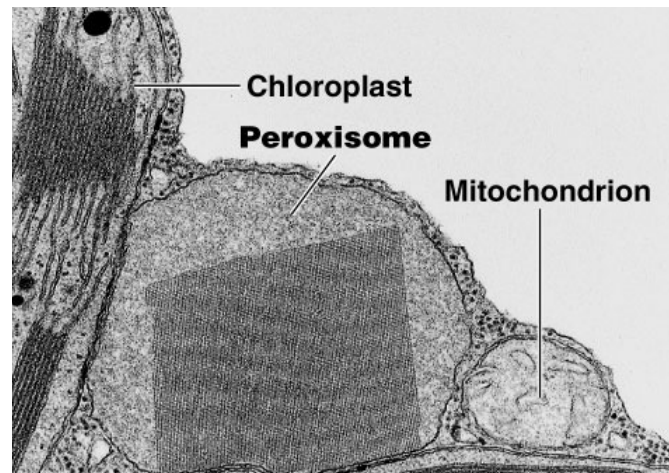


(a) Lysosomes in a white blood cell

(b) A lysosome in action

Lysosomes and Peroxisomes

Mason Paul & Rhianna Dilworth



Structure

Lysosomes

- Belong to the Endomembrane System.
- Membrane-bounded sac of hydrolytic enzymes.
- Compartmental organization.
- Some arise by budding from the trans face of the G.A.
- Proteins on the inner surface have 3-D conformations that protect vulnerable bonds from enzymatic attack.

Peroxisomes

- Roughly spherical.
- Often have a granular or crystalline core (a dense collection of enzyme molecules).
- Bounded by a single membrane.
- Compartmental structure.
- Grow by incorporating proteins & lipids made in the cytosol.

Function

Peroxisomes

- Generate & degrade H_2O_2
- Its enzymes transfer H from various substrates to O, producing H_2O_2 as a by-product; H_2O_2 is then converted to water.
- Some use O to break down fatty acids.
- Detoxify alcohol and other harmful compounds in liver.

Anatomy of the Lysosome

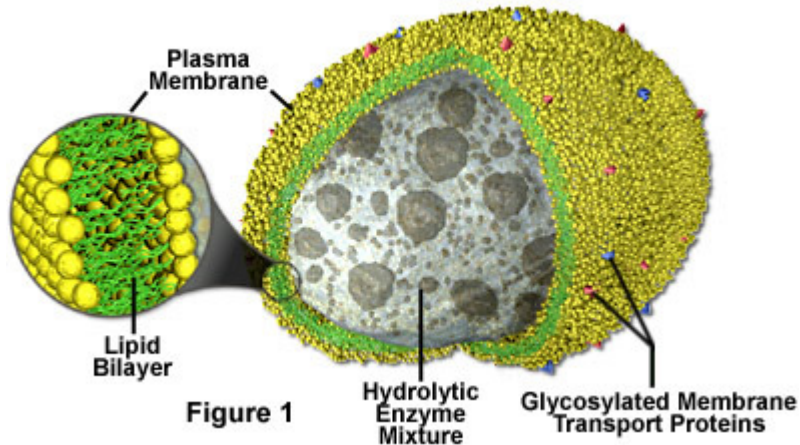


Figure 1

Lysosomes

- Digests Macromolecules
- Work best at pH 5
- Intracellular digestion
 - Phagocytosis
- Recycle cell material
 - Autophagy
- Allows the cell to continually renew itself

Anatomy of the Peroxisome

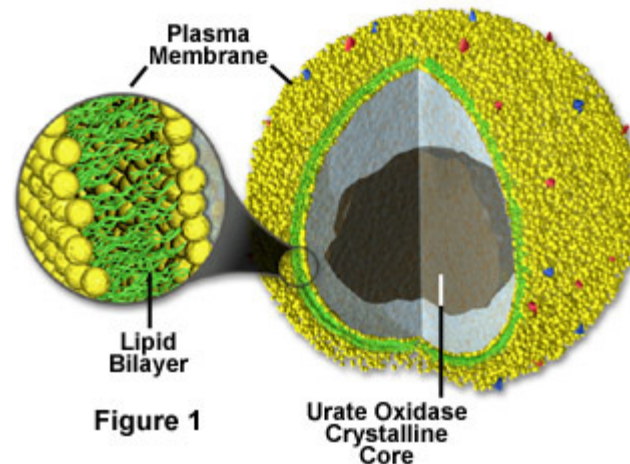


Figure 1

Analogy

Peroxisomes

Boiling water detoxifies certain foods (like peanuts)

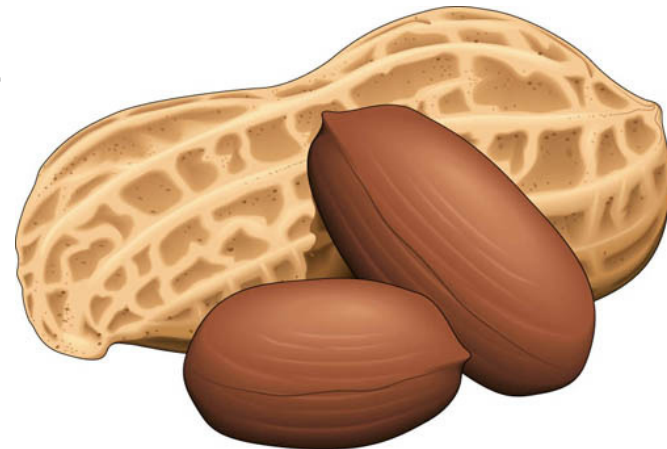
Peroxisomes detoxify certain chemicals (like alcohol)



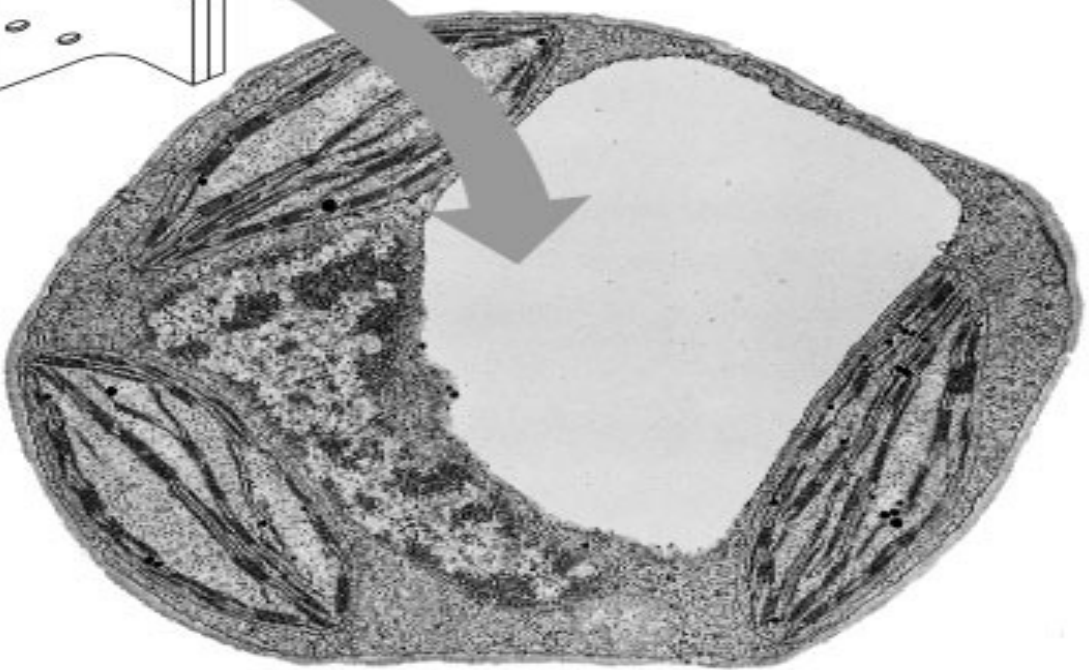
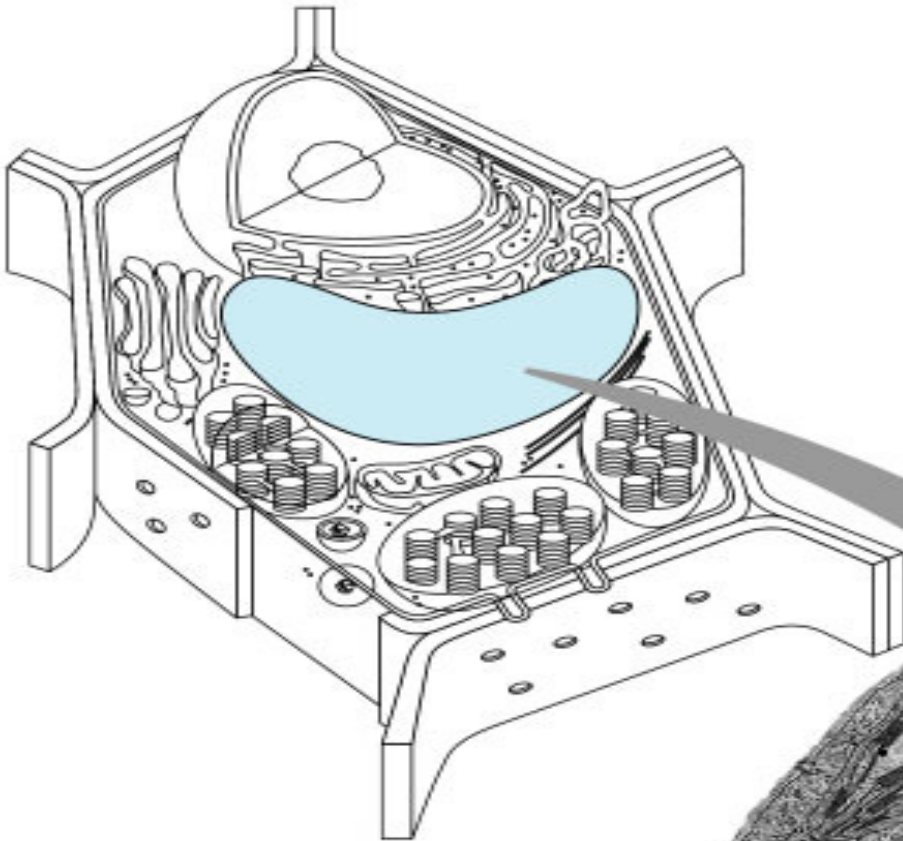
Lysosomes

Vultures get rid of community refuse and break it down into usable components (fertile soil)

Lysosomes recycle cell refuse



The Vacuole

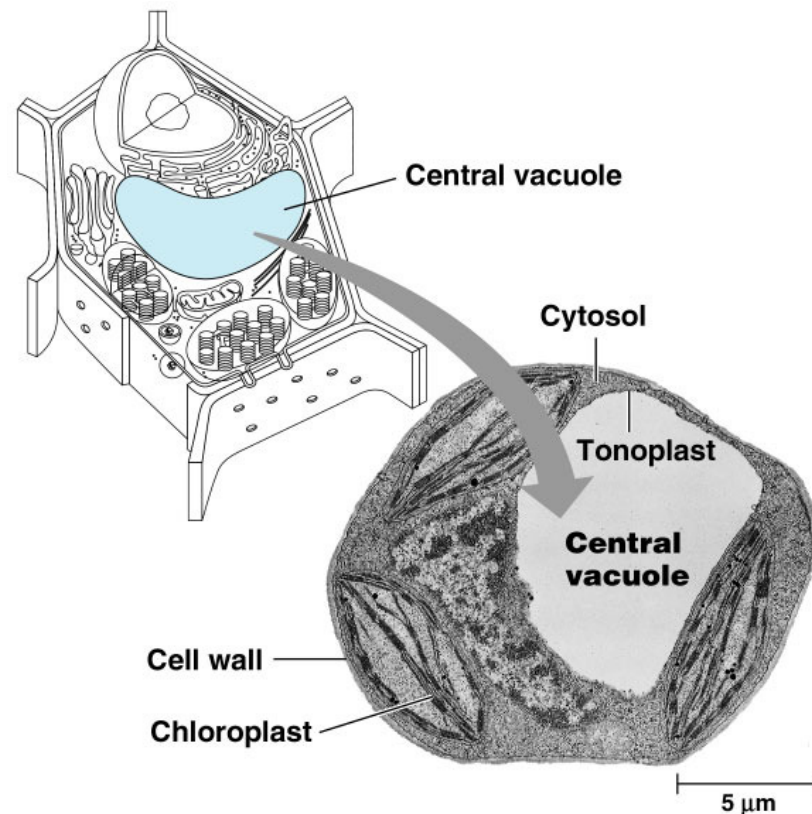


5 μm

Michael Terrio
and Carolyn
Robinson

Structure

- Vacuoles are membrane bound sacs.
- In animal cells there are multiple, small vacuoles. In plant cells there is one big vacuole.



Functions



- Vacuoles play a role in intracellular digestion
- They hold and release cellular waste products.
- In plant cells, they help regulate turgor pressure. Turgor pressure is the pressure from the water on the inside of the cell pushing against the wall, making it rigid. When plants are well watered, the vacuoles fill with water therefore increasing the rigidity of the plant.

Analogy

- Vacuoles are like lunchboxes. They can hold water and food, and when you're done you throw the wrappers (waste) back in them for disposal.





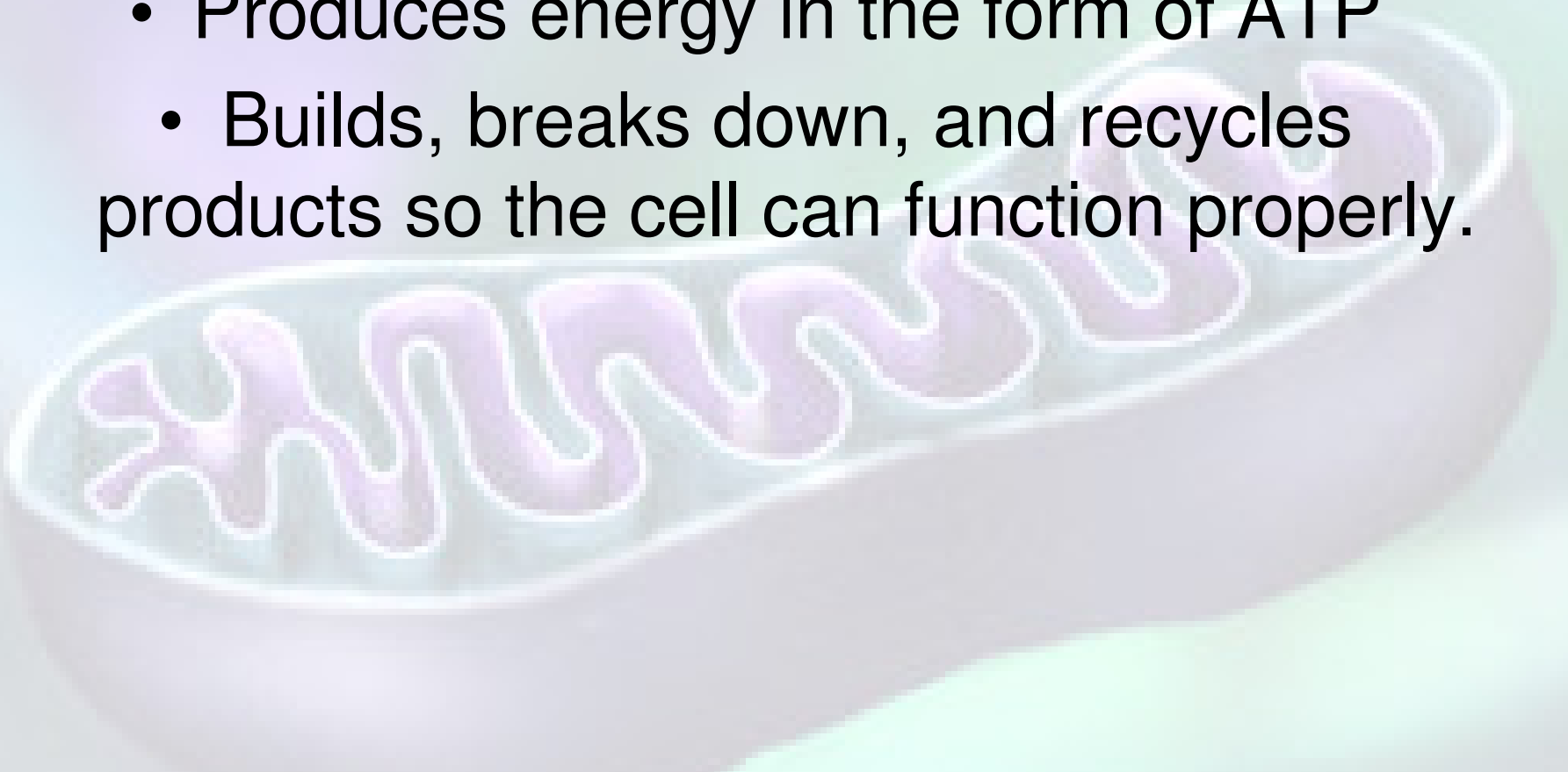
Mitochondria

“Powerhouse of the cell”

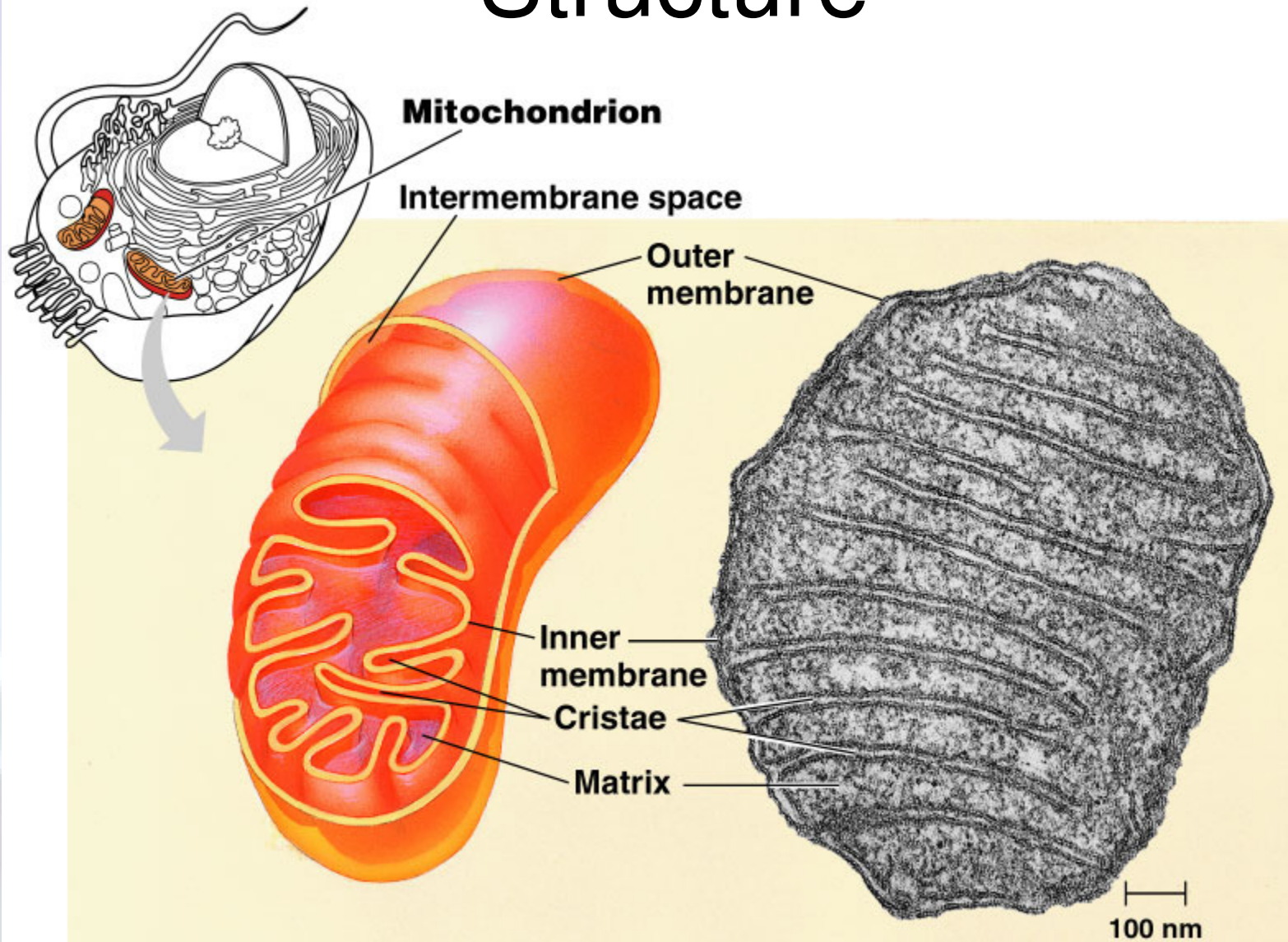
By: Kaitlin and Briina

Function

- Site of cellular respiration
- Produces energy in the form of ATP
- Builds, breaks down, and recycles products so the cell can function properly.

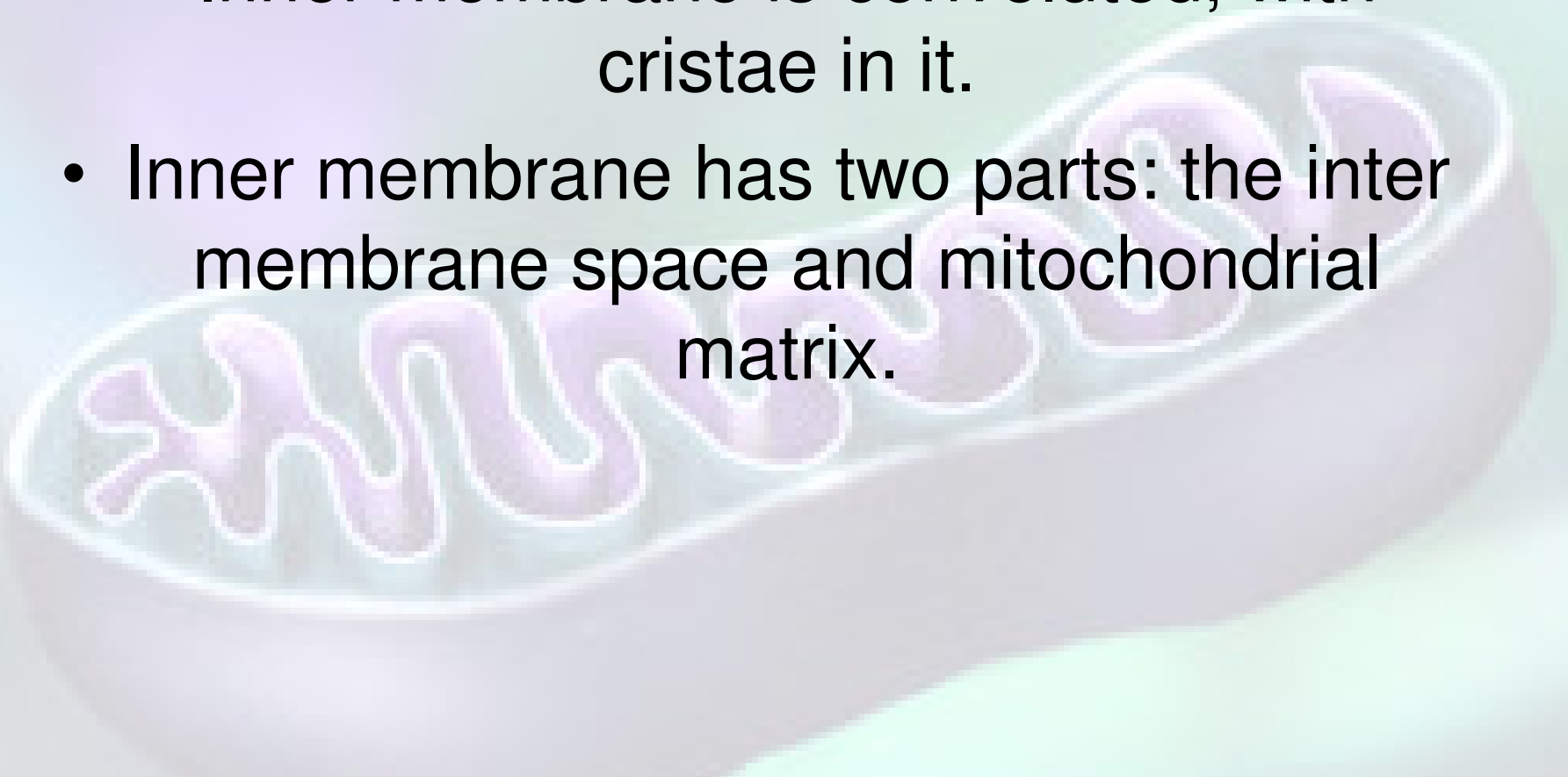


Structure



Structure

- Outer membrane is smooth.
- Inner membrane is convoluted, with cristae in it.
- Inner membrane has two parts: the inter membrane space and mitochondrial matrix.



Analogy

- Monster “energy drink” (they give you energy).

