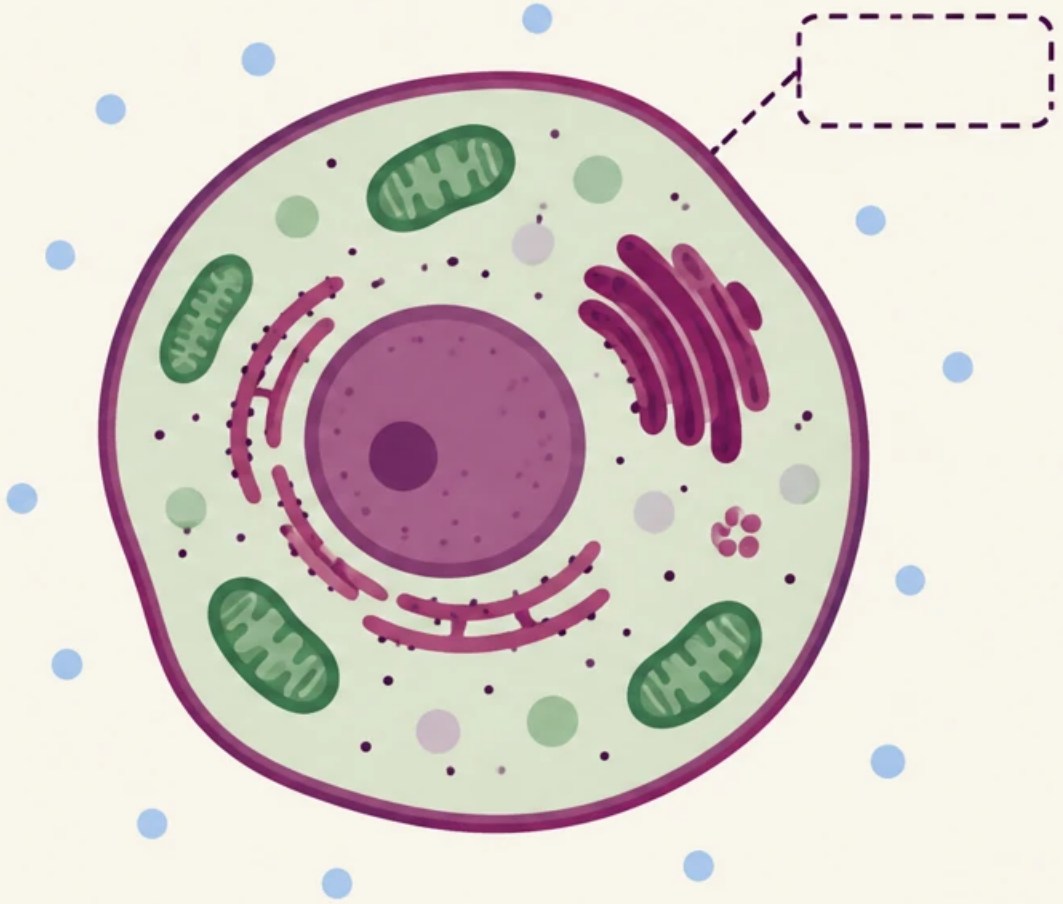
Question 1: Cell Boundaries

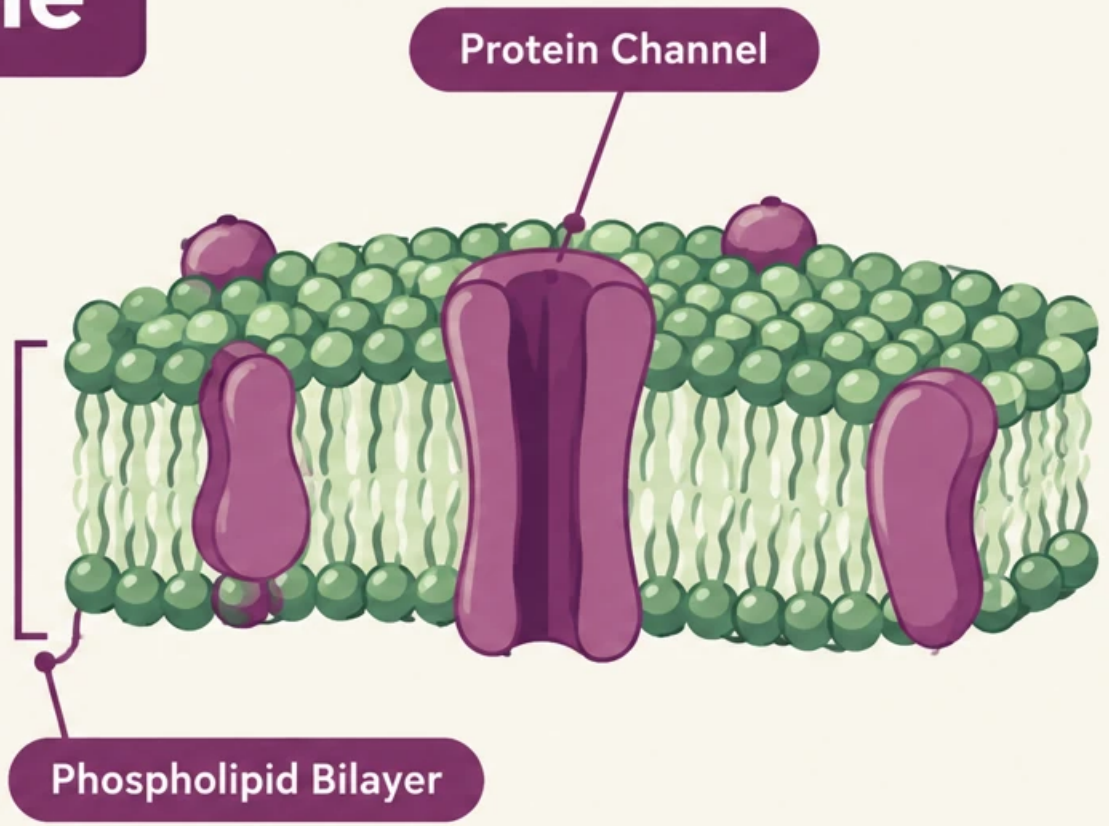
Which cell structure forms a flexible outer barrier that regulates what enters and exits the cell?



Answer 1: Cell Membrane

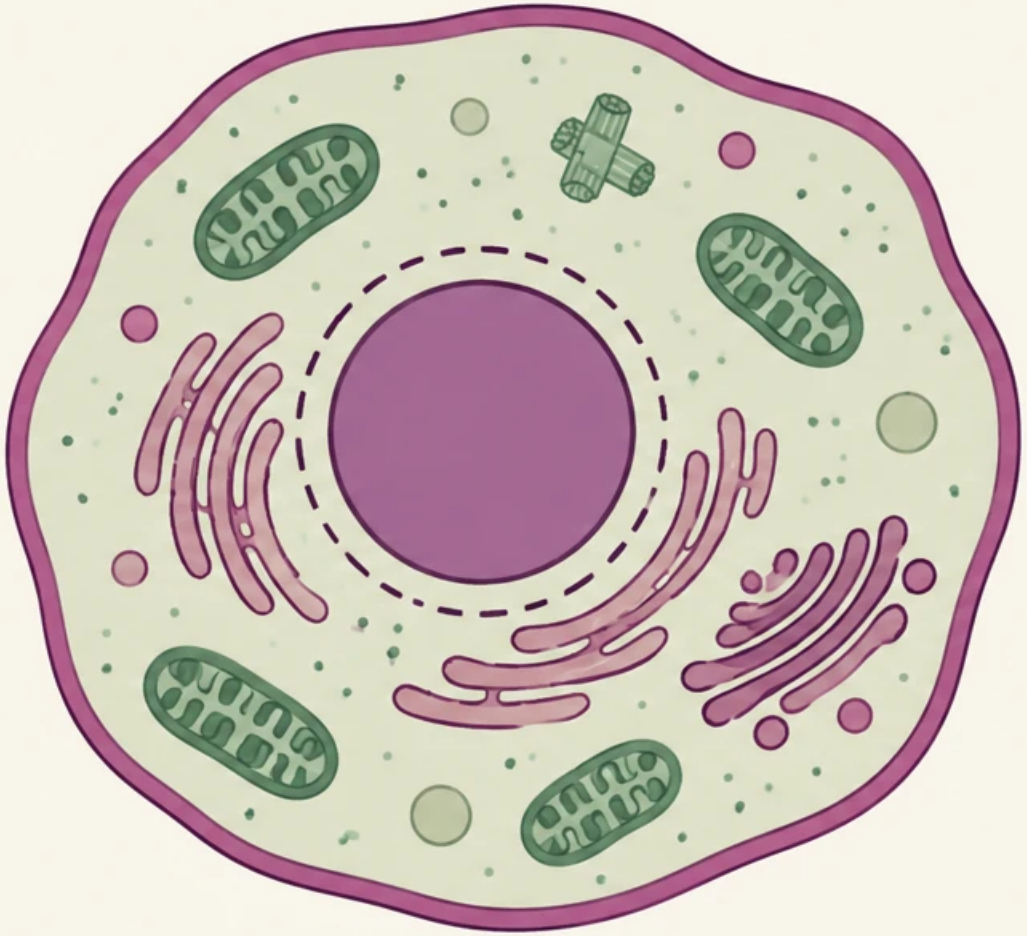
Cell Membrane.

The cell membrane is a semipermeable phospholipid bilayer that encloses the cytoplasm and maintains internal stability. It regulates the entry of essential nutrients and water while keeping out harmful substances and exporting cellular waste.



Question 2: Cellular Control

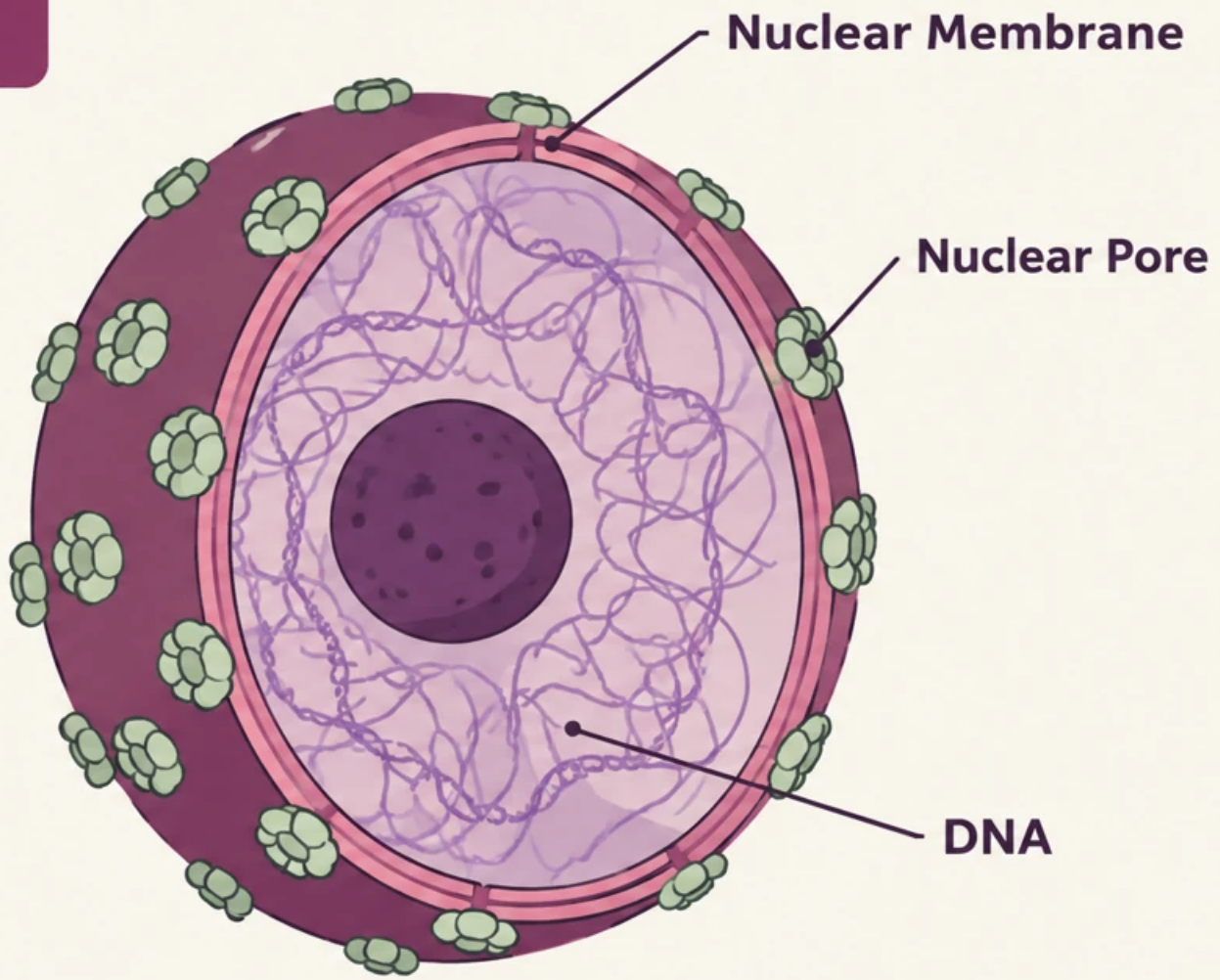
Which large organelle acts as the control center of the cell by storing its genetic instructions?



Answer 2: Nucleus

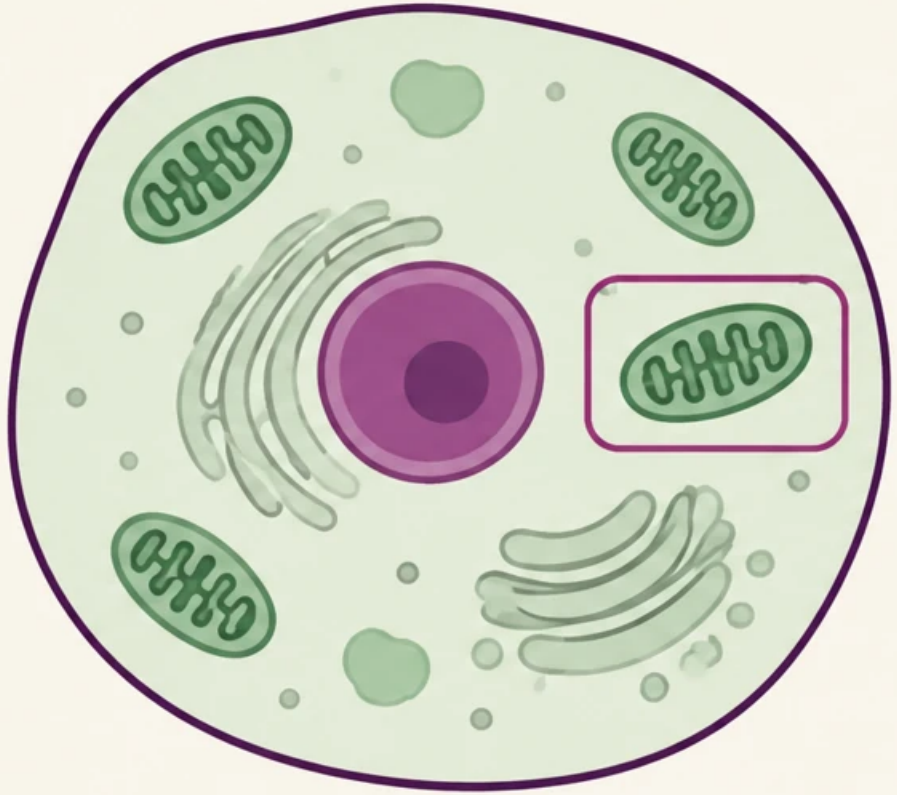
Nucleus.

The nucleus functions as the cell's command center by housing chromosomes made of DNA that encode instructions for protein synthesis. It is enclosed by a double-layered nuclear membrane containing pores that regulate molecular traffic between the nucleoplasm and cytoplasm.



Question 3: Energy Production

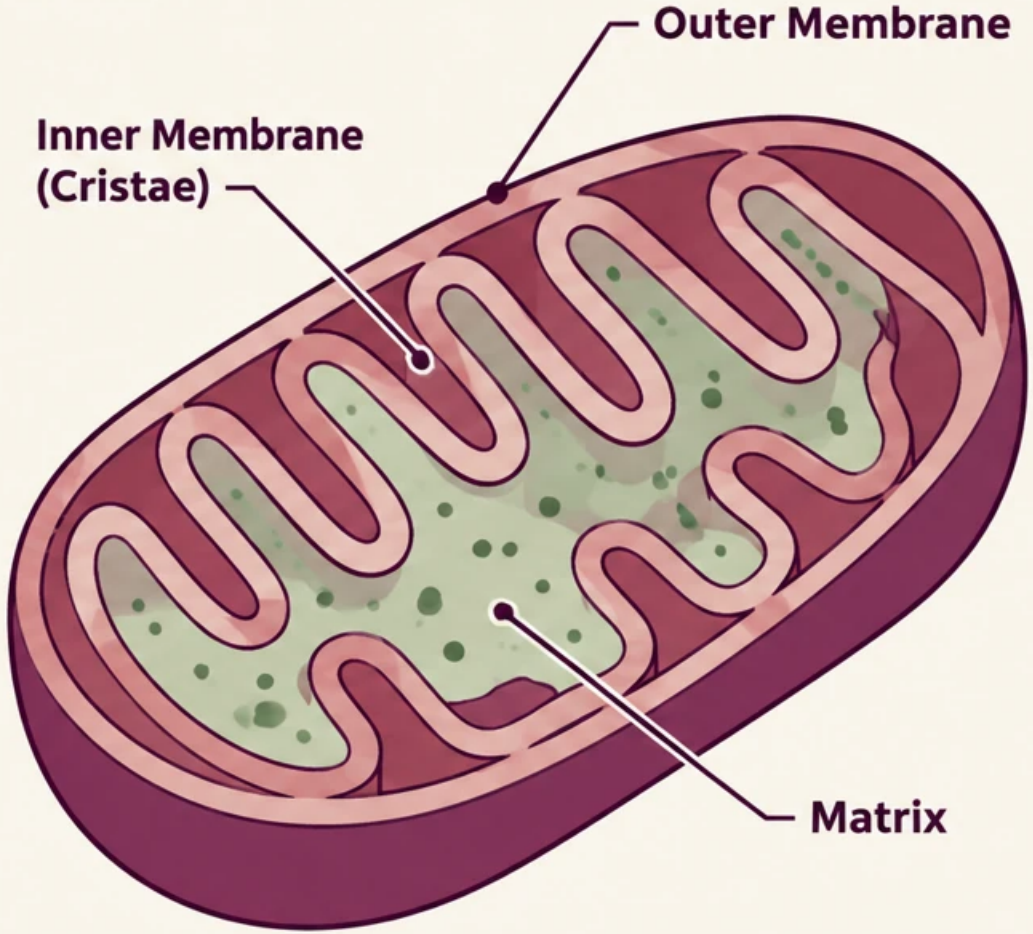
Which oval-shaped organelles are known as the power plants of eukaryotic cells because they release usable chemical energy?



Answer 3: Mitochondria

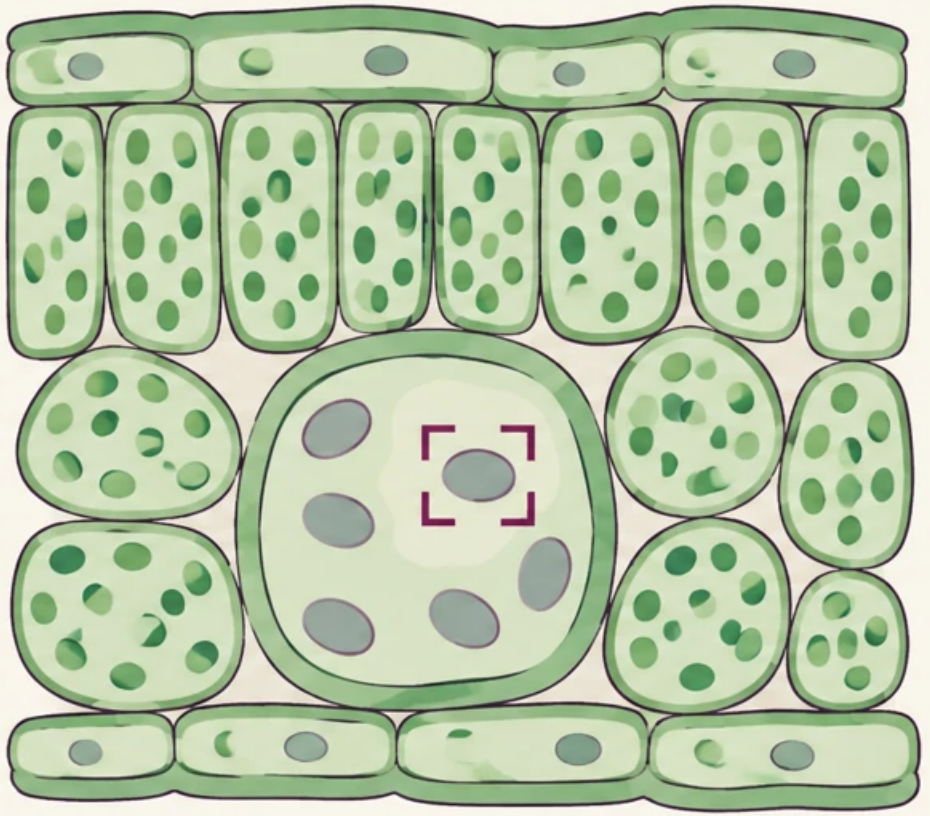
Mitochondria.

Mitochondria convert biochemical energy from nutrients into adenosine triphosphate (ATP) through the process of cellular respiration. Their highly folded inner membrane creates cristae that maximize the surface area available for energy-generating chemical reactions.



Question 4: Photosynthetic Structures

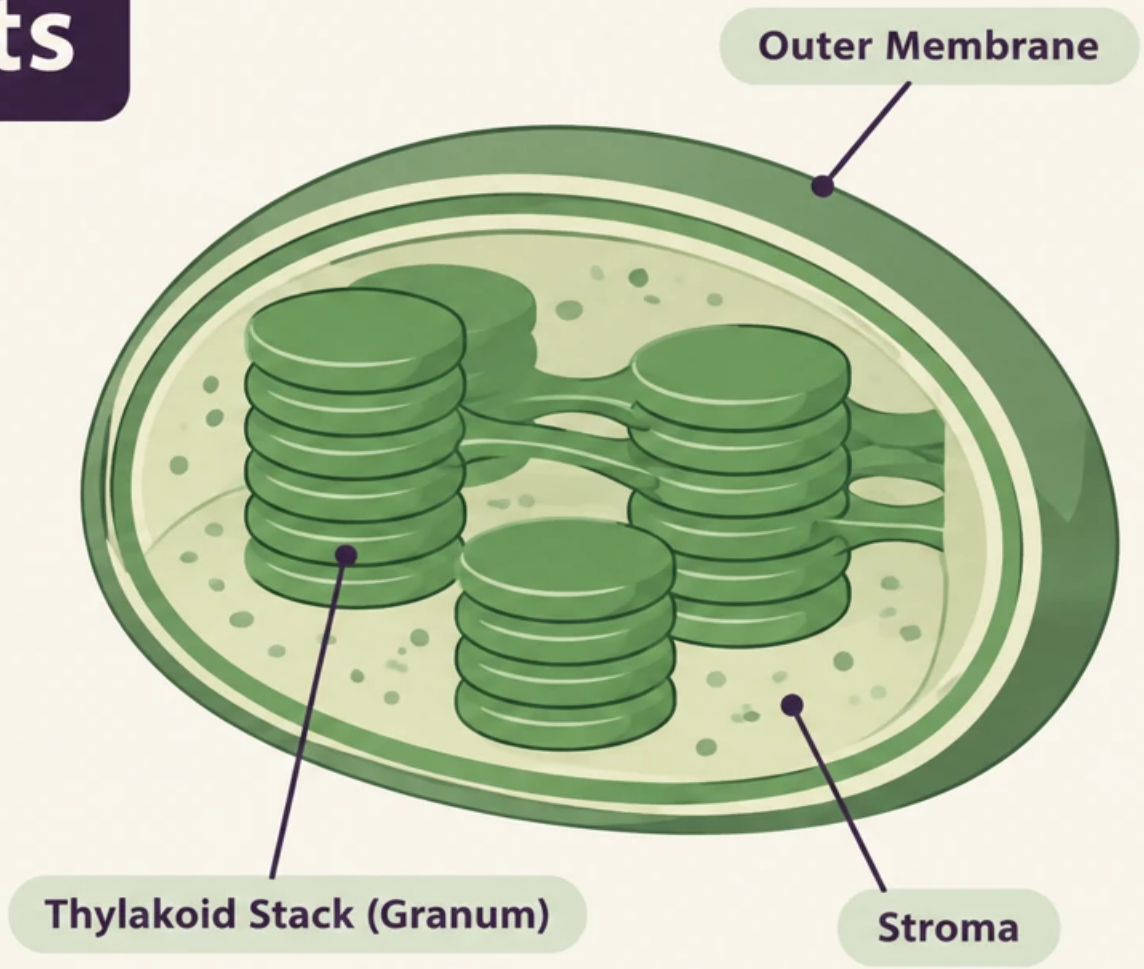
Which green organelles in plant cells capture sunlight to produce glucose through photosynthesis?



Answer 4: Chloroplasts

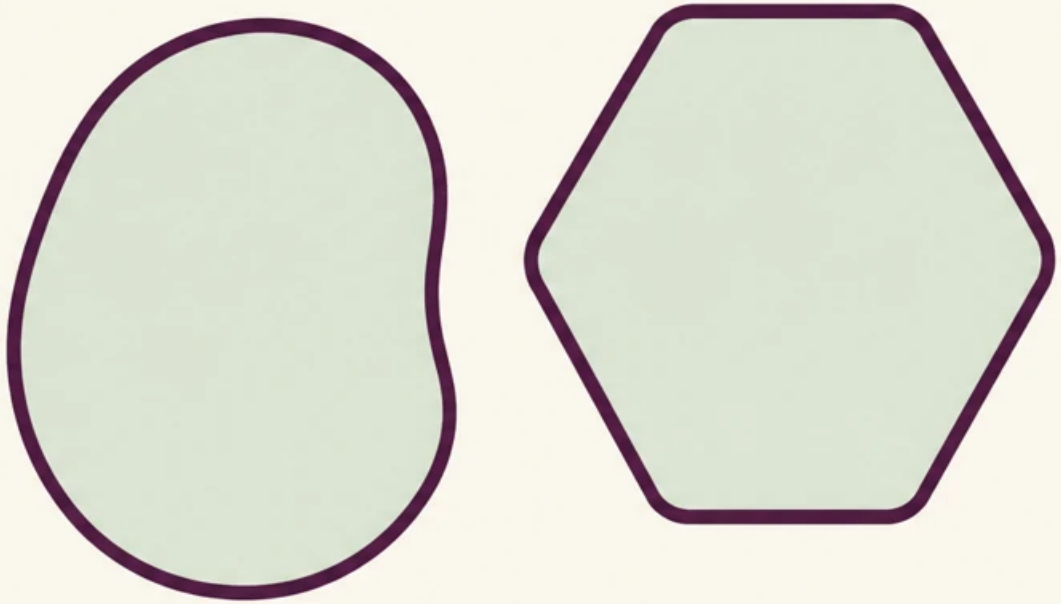
Chloroplasts.

Chloroplasts contain the green pigment chlorophyll, which absorbs light energy to convert carbon dioxide and water into energy-rich sugars. Inside each chloroplast, disc-like thylakoids stacked into grana provide the structural framework for capturing solar energy.



Question 5: Comparing Cell Types

What are the primary structural differences that set plant cells apart from animal cells?



Answer 5: Plant vs. Animal Cells

Cell Wall, Large Central Vacuole, and Chloroplasts.

Plant cells possess a rigid cellulose cell wall outside the membrane, chloroplasts for photosynthesis, and a large central vacuole that maintains internal turgor pressure.

In contrast, animal cells lack cell walls and chloroplasts, having only flexible membranes and small, temporary vacuoles.

