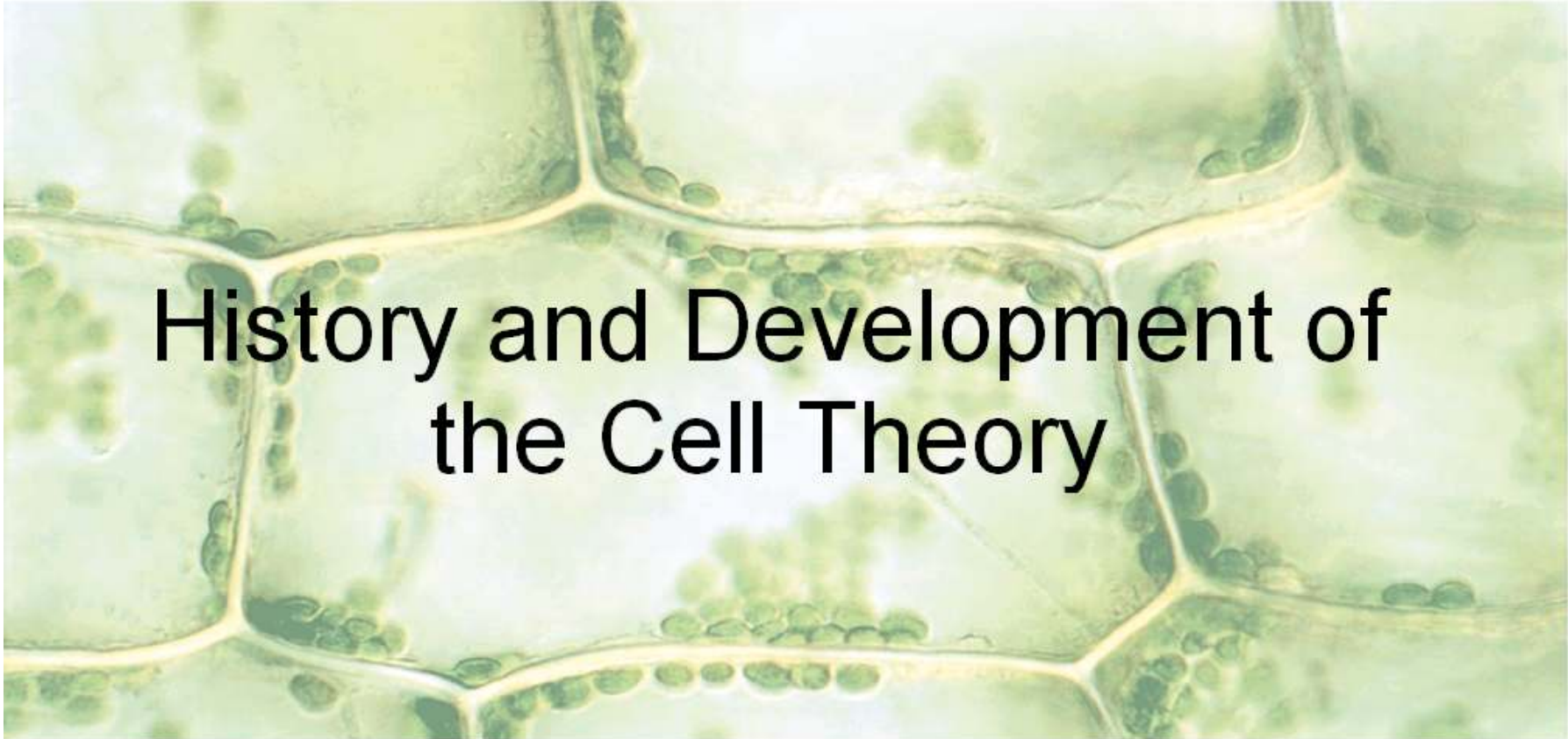


A microscopic image of plant cells, likely from an onion skin, showing a network of cells with thick, yellowish cell walls and green, oval-shaped chloroplasts. The cells are arranged in a brick-like pattern.

History and Development of the Cell Theory

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Pick Up...Read:

A unifying concept: the history of cell theory

Paolo Mazzarello

After the first observations of life under the microscope, it took two centuries of research before the 'cell theory', the idea that all living things are composed of cells or their products, was formulated. It proved even harder to accept that individual cells also make up nervous tissue.

What is Cell Theory?

What were the contributions of:

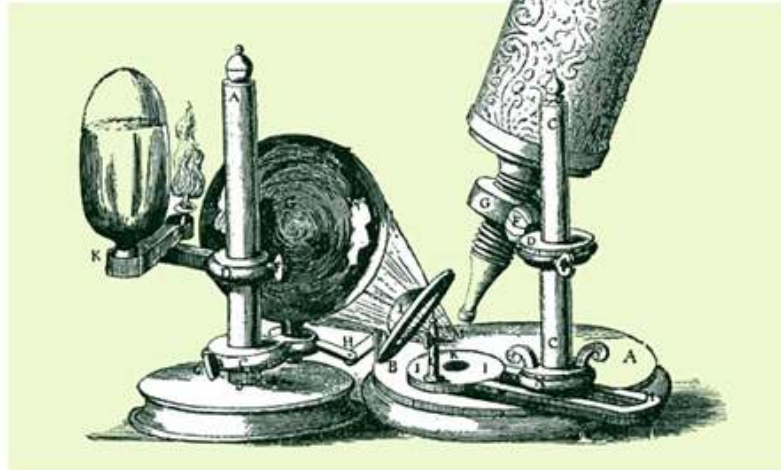
- Hooke
- van Leeuwenhoek
- Schleiden
- Schwann
- Virchow



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Robert Hooke:



van Leeuwenhoek:



Matthias Schleiden and Theodor Schwann:



Rudolf Virchow:



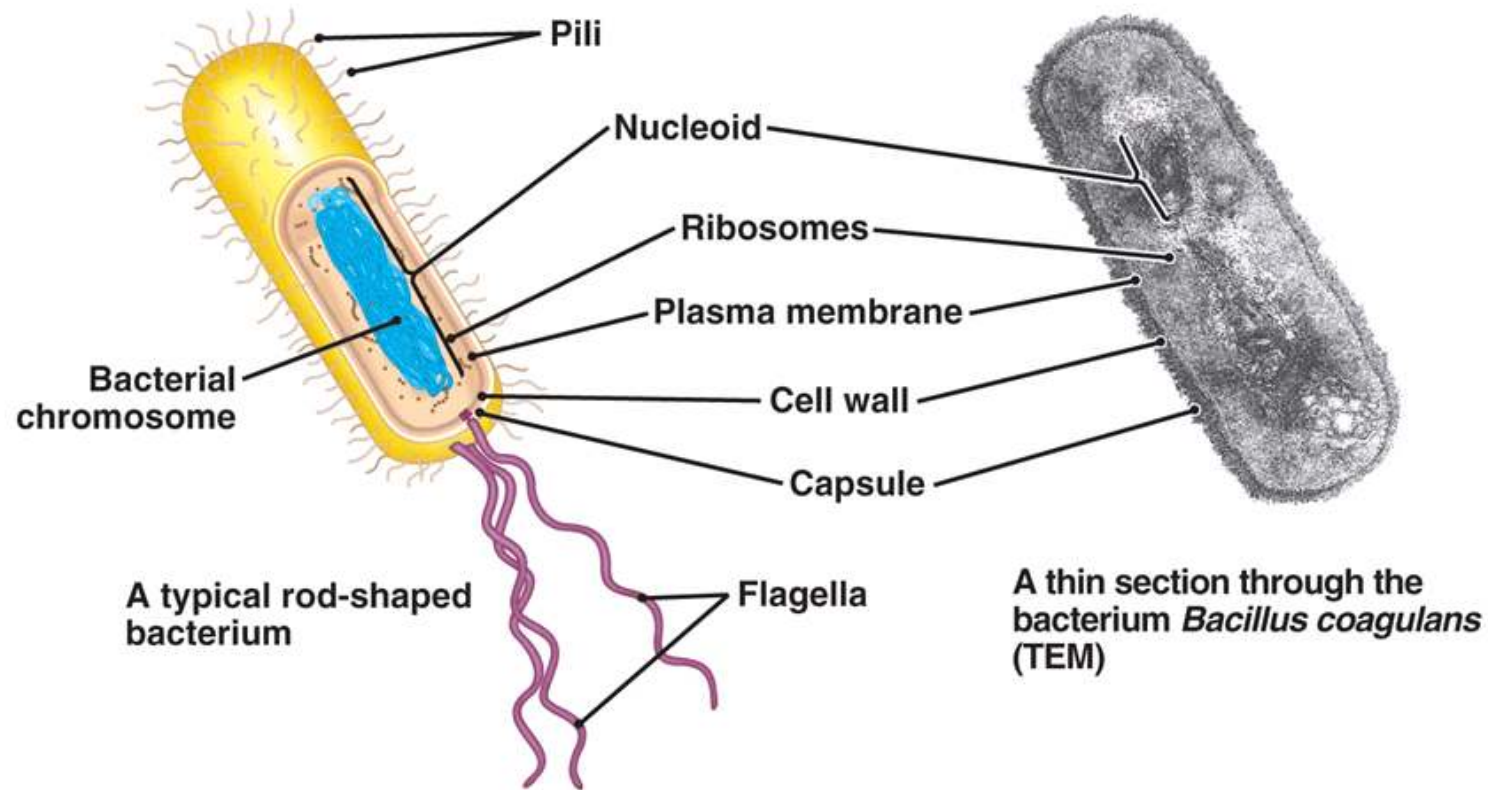
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Modern Tenets of the Cell Theory:

- **ALL known living things are made of 1 or more cells**
- **The cell is the structural and functional unit of life**
- **ALL cells come from pre-existing cells and pass on hereditary information during cell division**

Two Types of Cells:

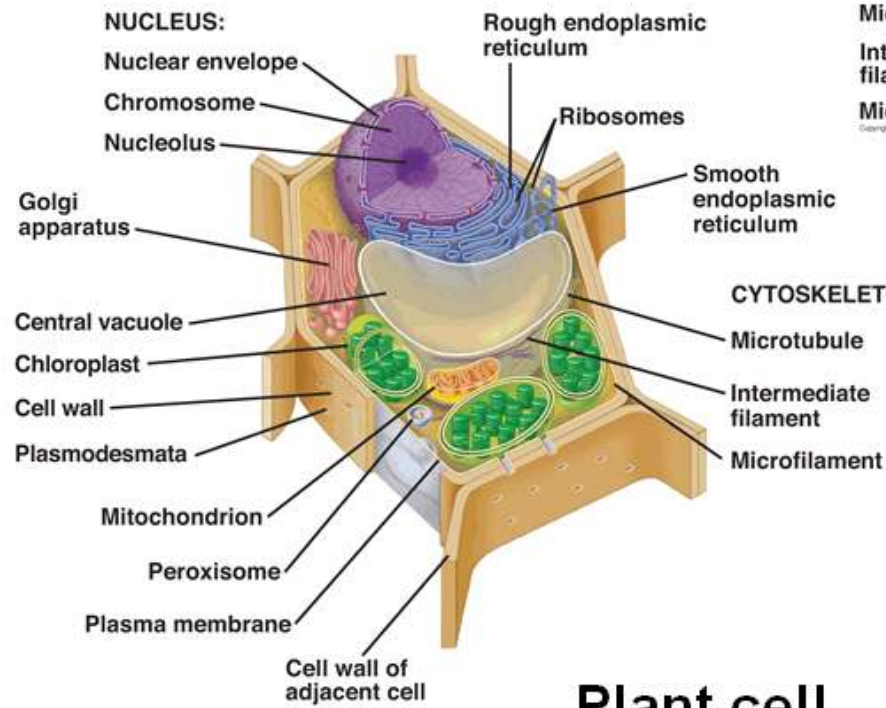
Prokaryotes



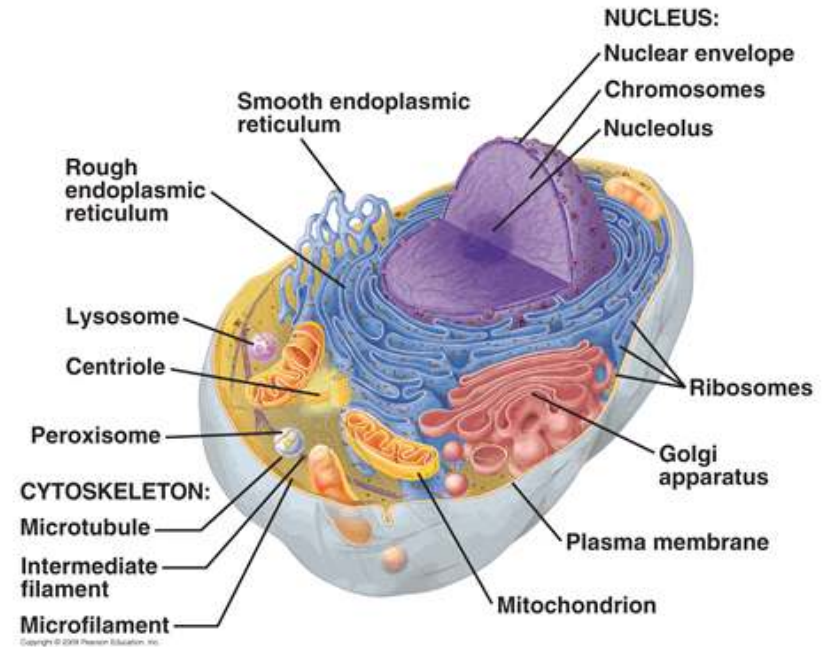
What is a "germ"? → disease causing entity

Are bacteria "germs"?

Eukaryotes



Plant cell



Animal cell

- Bacteria and archaea are **prokaryotic** cells
- All other forms of life are **eukaryotic** cells
 - Both prokaryotic and eukaryotic cells have a plasma membrane and one or more chromosomes and ribosomes
 - Eukaryotic cells have a membrane-bound nucleus and a number of other organelles, whereas prokaryotes have a nucleoid and no true organelles
- There are four life processes in eukaryotic cells that depend upon structures and organelles
 - Manufacturing
 - Breakdown of molecules
 - Energy processing
 - Structural support, movement, and communication

TABLE 4.23 EUKARYOTIC CELL STRUCTURES AND FUNCTIONS**1. Manufacturing**

Nucleus	DNA synthesis; RNA synthesis; assembly of ribosomal subunits (in nucleoli)
Ribosomes	Polypeptide (protein) synthesis
Rough ER	Synthesis of membrane lipids and proteins, secretory proteins, and hydrolytic enzymes; formation of transport vesicles
Smooth ER	Lipid synthesis; detoxification in liver cells; calcium ion storage
Golgi apparatus	Modification and transport of macromolecules; formation of lysosomes and transport vesicles

2. Breakdown

Lysosomes (in animal cells and some protists)	Digestion of ingested food, bacteria, and a cell's damaged organelles and macromolecules for recycling
Vacuoles	Digestion (like lysosomes); storage of chemicals; cell enlargement; water balance
Peroxisomes (not part of endomembrane system)	Diverse metabolic processes, with breakdown of H ₂ O ₂ by-product

3. Energy Processing

Mitochondria	Conversion of chemical energy of food to chemical energy of ATP
Chloroplasts (in plants and some protists)	Conversion of light energy to chemical energy of sugars

4. Support, Movement, and Communication Between Cells

Cytoskeleton (including cilia, flagella, and centrioles in animal cells)	Maintenance of cell shape; anchorage for organelles; movement of organelles within cells; cell movement; mechanical transmission of signals from exterior of cell to interior
Extracellular matrix (in animals)	Binding of cells in tissues; surface protection; regulation of cellular activities
Cell junctions	Communication between cells; binding of cells in tissues
Cell walls (in plants, fungi, and some protists)	Maintenance of cell shape and skeletal support; surface protection; binding of cells in tissues