

Chapter 2

The Cell: the Basic Unit of Life

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Cell Organization

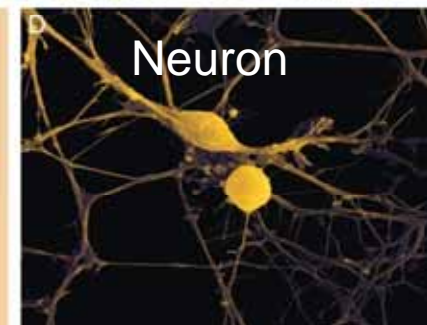
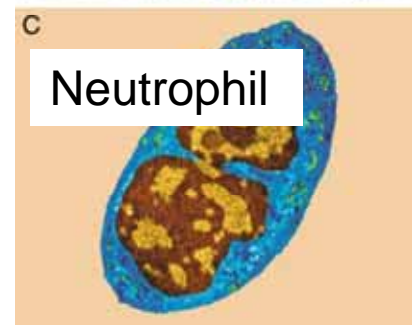
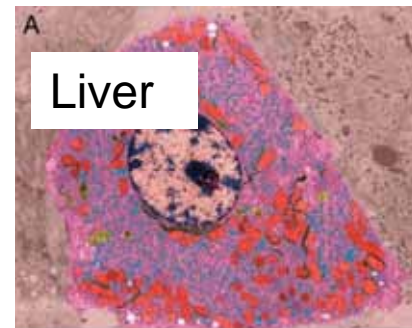
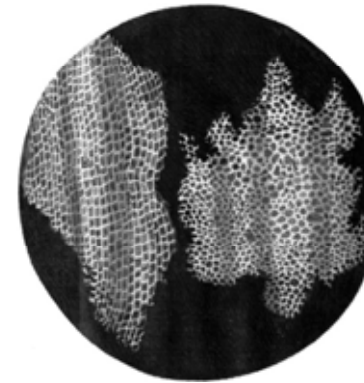
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Two Fundamental Cell
Types

Cells

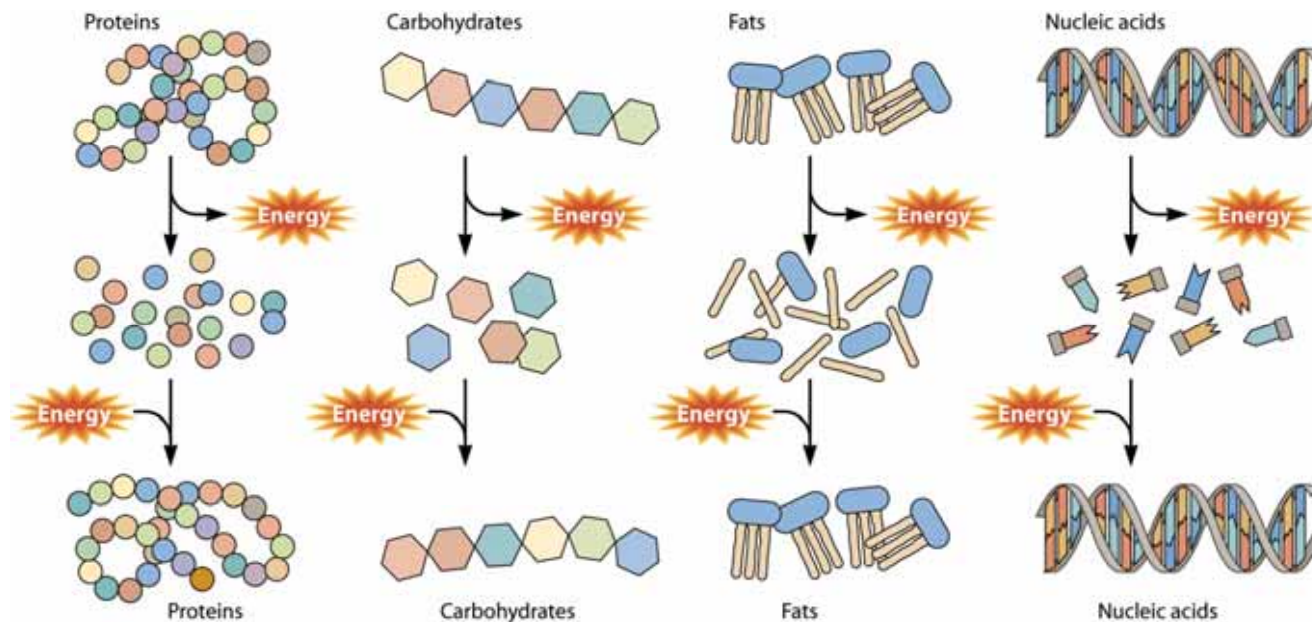
- Cells

- Basic....
- First named by ...
- Different types but ...
- Same building blocks



Essential Functions of Living Cells

- Growth
 - Metabolism
 - Catabolism: breaking down large molecules....
 - Anabolism: generation of large molecules....



Essential Functions of Living Cells

■ Reproduction

■ Cell cycle

- Cyclical process of
- Daughter cell must receive...

→DNA replication before...

■ Maintenance of internal environments

■ Use energy to maintain the internal environments

- Unique molecules in a cell
 - .
- Some same molecules as outside but
 - ...
 - .



Essential Functions of Living Cells

- Response to external environments
 - ..
 - Respond
 - Maintaining osmotic homeostasis
 - Bacterial chemotaxis
 - Release of digestive enzymes from stomach cells
 -



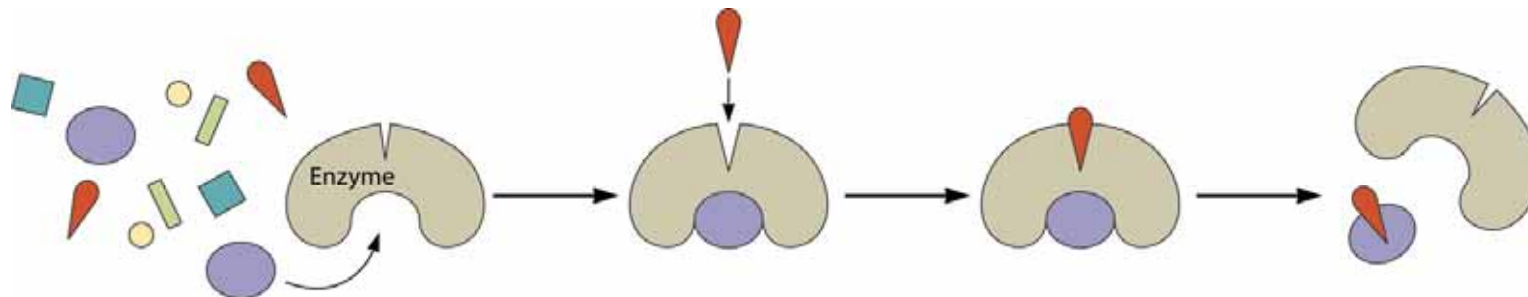
Essential Functions of Living Cells

- Communication with each other
 - Between..
 - e.g. Nerve cell and muscle
 - Between..
 - e.g. Mating of yeast cells, quorum sensing of bacteria
- Differentiation in multicellular organisms
 - Cells differentiate to ..
 - Specific cells organize into ..



Common Cellular Processes

- Constant supply of energy is necessary.
 - Need energy for ..
 - Energy source
 - ...
 - ...
- Chemical reactions
 - Enzymes:



Common Cellular Processes

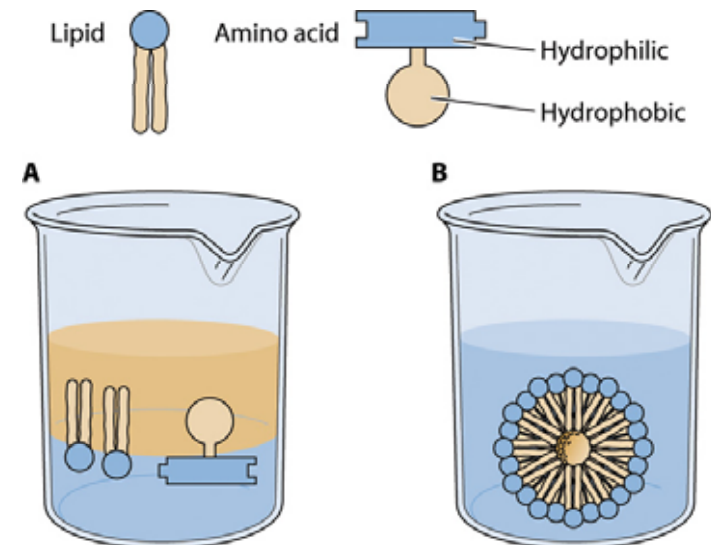
- Cell processes occur in a series of small steps
 - Pathway: ...
- Regulation of processes
 - Regulation of various processes by ...
 - Cell cycle, blood sugar levels, blood pressure, body water balance etc.

Cell Organization

- Interaction of molecules with water
 - Important factor for ...
 - Hydrophilic (..) or Hydrophobic (..)
 - Congregation of hydrophilic parts with other hydrophilic parts
 - Congregation of hydrophobic parts with other hydrophobic parts

- Binding of molecules

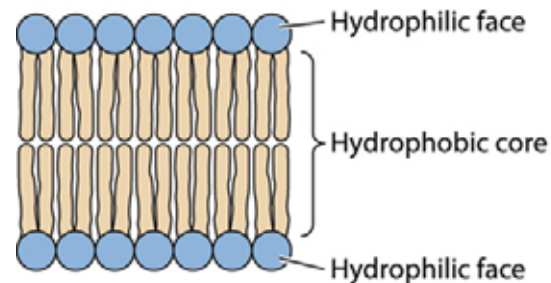
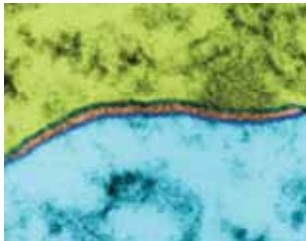
- Specificity of molecular bindings determines cellular processes
- Binding: ..
 - Depends on ...



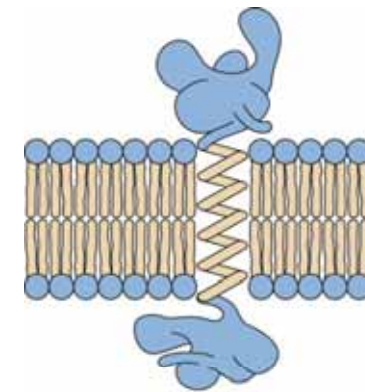
Cellular Membranes

- Provide structural organization
 - Lipid bilayer with ...
 - Plasma (cell) membrane: Hydrophobic barrier between inside (cytoplasm) and outside of the cell
 - Internal membranes

- ..
- ..
- ..
- ..



A protein embedded in a membrane



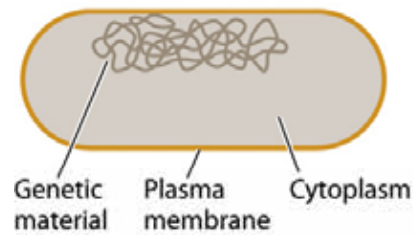
- Control molecular transport across the membrane
 - Free diffusion
 - ...
 - Transport through ...

Two Fundamental Cell Types

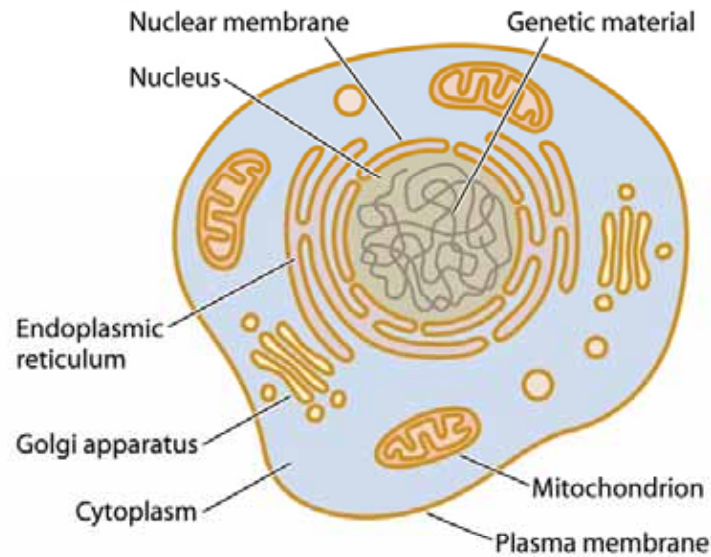
- Prokaryotic cells
 - Prokaryote (pro; before, karyon: kernel or nucleus)
 - No ..
 - Small (0.2-2 μm), mostly single-celled organisms
 - ..
 - ..
- Eukaryotic cells
 - Eukaryote (well-formed nucleus)
 - Nuclear and internal membranes \rightarrow ..
 - Larger than prokaryotes (10-100 μm)
 - Single-celled: ..
 - Multicellular: ..l

Two Fundamental Cell Types

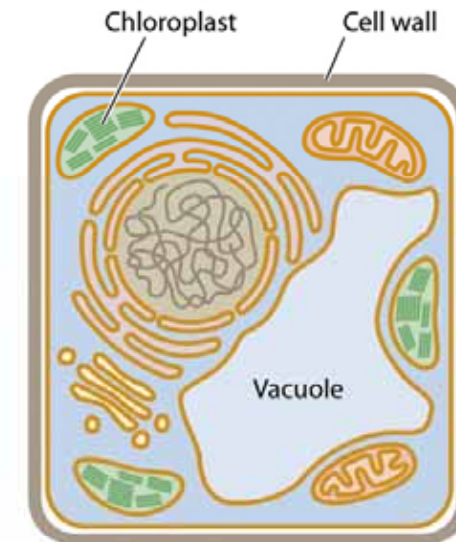
A. Prokaryotic cell



B. Eukaryotic animal cell



C. Eukaryotic plant cell



Viruses

- Not ..
- No .. (not alive by itself)
 - Genetic material (DNA or RNA)
 - Proteins (Capsid)

