Cell Overview

- **Definition**: In biology, a cell is the basic membrane-bound unit that contains the fundamental molecules of life. Cells can be independent organisms (e.g., bacteria, yeast) or specialized units within multicellular organisms (e.g., humans, animals).
- **Size**: Cells vary in size; the smallest known are mycoplasmas, about 0.2 μm in diameter. Human cells are approximately 20 μm across.
- **Types**: Cells can be prokaryotic (lacking organelles) or eukaryotic (containing organelles such as a nucleus, mitochondria, etc.).

Cell Structure

- **Membrane**: A plasma membrane encloses the cell, acting as a selective barrier to regulate the entry of nutrients and the exit of waste.
- **Organelles**:
    - **Nucleus**: Contains genetic information crucial for cell growth and reproduction.
    - **Mitochondria**: Responsible for energy production.
    - **Lysosomes**: Digest unwanted materials.
    - **Endoplasmic Reticulum & Golgi Apparatus**: Involved in synthesizing and sorting molecules for various functions.
    - **Chloroplasts (in plant cells)**: Essential for photosynthesis.
    - **Cytoskeleton**: Provides cell shape, facilitates movement of organelles, and assists in cell motion.
    - **Cytosol**: The internal fluid where a network of molecules supports biosynthesis.

Cell Functions

- **Metabolism**: Cells metabolize nutrients, produce energy, and synthesize molecules.
- **Communication**: In multicellular organisms, cells differentiate to perform specialized functions, maintaining constant communication with neighboring cells.
- **Reproduction**: Cells grow by ingesting molecules and dividing to produce two daughter cells.

Differences Between Cell Types

- **Animal vs. Plant Cells**: Plant cells contain chloroplasts for photosynthesis, unlike animal cells. The article gives special emphasis on animal cells, noting the energy-synthesizing processes unique to plants.
- **Eukaryotic vs. Prokaryotic Cells**: Eukaryotic cells contain organelles, while prokaryotic cells do not. Despite structural differences, all cells share similar biochemical functions.

Cellular Components

- **Molecules**: Cells comprise organic molecules like sugars, amino acids, nucleotides, and fatty acids. These molecules form macromolecules:
    - **Proteins**: Make up the largest portion of a cell's macromolecules.
    - **DNA & RNA**: Store and transmit genetic information.
    - **Lipids**: Form the cell membrane.
- **Catalysis**: Enzymes, primarily proteins, facilitate cellular reactions.

Chemical Composition

- **Water**: Makes up 70% of a cell's weight.
- **Macromolecules**: Proteins, RNA, DNA, lipids, and polysaccharides comprise the rest.

Evolution of Cells

- Cells are products of a long evolutionary process, with proteins and RNA playing crucial roles in early cellular development. RNA molecules are thought to have preceded proteins as catalysts during evolution.

Related Topics

- The article mentions related topics such as stem cells, DNA repair, membrane structure, and cellular communication.

Recent News

- A pathway tied to cancer-driving genome alterations was identified (as of Sep 11, 2024).

This extracted summary covers the key points regarding cell structure, function, and differences between cell types, as well as the biochemical processes that take place within cells.