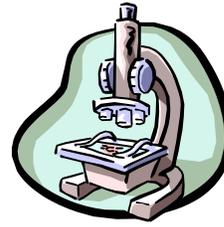
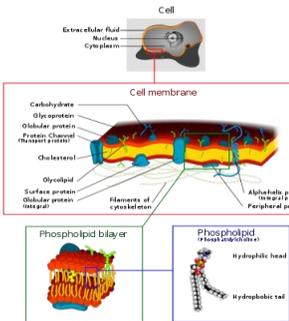


THE CELL ORGANELLES



plasma or cell membrane



The *cell*, or *plasma*, *membrane* surrounds the cell. It plays an active role in determining which substances enter and which substances leave the cell, and therefore *maintains homeostasis* within the cell. Because some substances can pass freely through the cell membrane and others cannot, the membrane is said to be *selectively permeable*, or *semipermeable*. The permeability of the plasma membrane varies from one cell type to another and from time to time in the same type of cell, depending on the state of metabolic activity. The cell membrane is composed of lipids and proteins. It is often referred to as a *phospholipid bilayer*.

Questions

1. Describe the functions of the cell membrane.
2. The cell membrane is composed of _____ and _____.
3. Why is the cell membrane described as “semipermeable?”

Flagella are long filamentous extensions of the cell membrane. They are used for movement of single cells or single celled organisms. Cells can have one to many flagella.

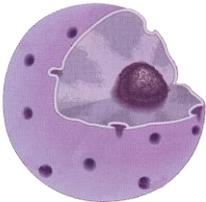
flagella

Cilia are short hair-like extensions of the cell membrane. They are also used for movement.

cilia

1. What is the main function of flagella and cilia?
2. Name a male mammalian cell that has a flagella.

nucleus



The *nucleus* is the control center for all cell functions. It is surrounded by a semipermeable membrane. Within the nucleus are the chromosomes that carry the genetic “blueprints.” During most of a cell’s life the genetic material is found in the form of a loosely tangled mixture of DNA and protein called *chromatin*. The nucleus also contains at least one nucleolus. The nucleolus is a site of RNA synthesis, and it may also be responsible for the production of ribosomes.

nucleolus

Questions

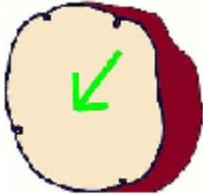
1. The control center of the cell is the _____.
2. What are the functions of the nucleolus?

nuclear membrane/envelope

The *nucleus* is surrounded by the *nuclear membrane*. This is a porous membrane.

cytoplasm

(80% H₂O)



The material in the cell outside the nucleus is called *cytoplasm* or *cytosol*. Although it contains thousand of substances, it consists mainly of water. Within the cytoplasm are the various organelles of the cell. The cytoplasm provides the environment in which the organelles carry out the chemical reactions responsible for the life processes of the cell.

Questions

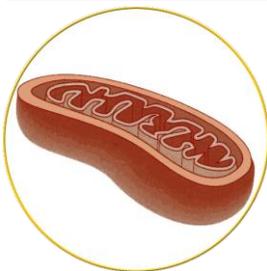
1. What is the main function of the cytoplasm?
2. The cytoplasm consists mainly of _____.

cytoskeleton

Through a series of intercellular proteins, the *cytoskeleton* gives a cell its shape, offers support, and facilitates movement

1. What system in the human body could the cytoskeleton be compared to?

mitochondria

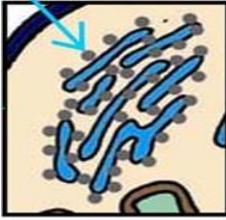


Mitochondria are slipper-shaped organelles found in the cytoplasm. Many call it the “powerhouse of the cell.” They are enclosed by a double membrane, whose inner layer is *highly folded*, so that it has *greater surface area*. Mitochondria are responsible for breaking down glucose into energy that the cell can use. Most stages of cell respiration occur in the mitochondria. The energy released when glucose is broken down during respiration is stored in the high-energy chemical bonds in molecules called *ATP*.

Questions

1. What is the function of the mitochondria?
2. In what substance is the energy released during cell respiration stored? _____
3. What is the advantage of the folding of the inner membrane of the mitochondrion?

ribosome



Ribosomes are small, dark, dense granules found free in the cytoplasm and the nucleus and lining the membrane of some endoplasmic reticulum. Ribosomes are composed mainly of RNA. They are the centers of protein synthesis in the cell and thus referred to as the “protein factory.” Amino acids are bonded together by peptide bonds to make a protein at the ribosome.

Questions

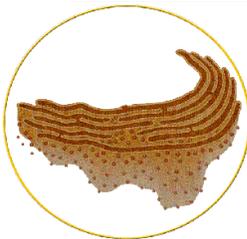
1. Where are ribosomes located in the cell?
2. What is the function of ribosomes?
3. What happens to amino acids at the ribosomes?

proteins

Proteins are building blocks for the cells, They are composed of a chain of amino acids and assembled by the ribosomes.

1. What are the monomers of a protein?
2. Where in the cell are proteins made?

endoplasmic reticulum

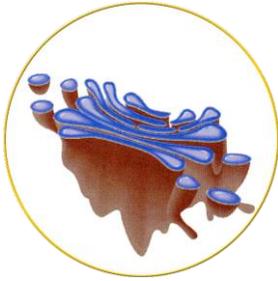


The *endoplasmic reticulum* is a membrane-bounded system of channels or tubes through which materials are transported within the cell. The membranes of the endoplasmic reticulum may also serve as sites of biochemical reactions. There are two types of endoplasmic reticulum – *smooth and rough*. The rough, or granular, appearance of some endoplasmic reticulum is due to the presence of ribosomes on the endoplasmic reticulum membranes. *Rough endoplasmic reticulum* is involved in protein synthesis. *Smooth endoplasmic reticulum*, which has no ribosomes on its membranes, is mainly involved in synthesis of non-protein substances.

Questions

1. What are the functions of the endoplasmic reticulum?
2. The two types of endoplasmic reticulum are _____ and _____.
3. In what types of cells are each found?

Golgi bodies



The *Golgi body* is made up of a series of membrane-enclosed sacs, and it is usually found near the nucleus. This organelle is associated with the production of lysosomes and with the synthesis of various secretions. These are carried either out of the cell or to various places within the cell in tiny membrane-bound *vesicles*. There are approximately 10-20 Golgi bodies in each cell.

Questions

1. What are the functions of the Golgi body?
2. Where is the Golgi body generally located in the cell?

lysosomes



Lysosomes are “packages,” or sacs, of digestive enzymes made by the Golgi apparatus. They keep the enzymes separated from the rest of the cell contents until they are needed. Lysosomes, which are found in both animal and plant cells, are egg-shaped structures enclosed by a membrane. Lysosomes are often referred to as the “suicide sacs” because they result in cell death if all the lysosomes release their enzymes into the cell. Most of the time, the enzymes within the lysosome help to digest old worn out parts of the cell. Some cells’ lysosomes help to breakdown foreign particles that could potentially harm the cell. So, they are called the garbage disposals of the cell.

Questions

1. What are the functions of lysosomes?
2. Where in the cell are lysosomes produced?

vacuoles

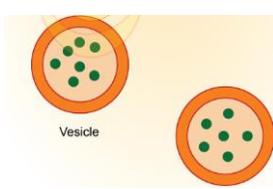


Vacuoles are membrane-enclosed structures that are generally filled with water containing various dissolved substances. Vacuoles in animal cells are usually small and numerous. Large vacuoles are often found in protists and in plant cells. In the protists, there are food vacuoles in which food is digested so that it can be used by the cell. In some, freshwater protozoa there are water vacuoles that remove excess water from the cell and discharge it back into the environment to maintain homeostasis. Much of the inside of a typical green plant cell is filled with one large vacuole. The pressure created by the fluid stored within the vacuole helps maintain the rigid structure of the cell and of the plant. This is called turgor pressure.

Questions

1. In protists such as the amoeba where does digestion occur?
2. How is excess water removed from freshwater protozoa?
3. What is the function of the large vacuole present in the cells of green plants?

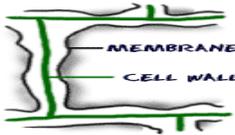
vesicles



When a cell needs to move a molecule many times, it uses *vesicles*. **Vesicles** are cellular organelles that are composed of a lipid bilayer. They are used to transport materials from one place to another. They also function in metabolism and enzyme storage as well.

1. What is the main function of a vesicle?
2. What do they store for use in metabolic processes?

cell walls

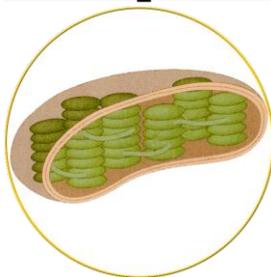


Cell walls are structures found just outside the cell membrane in plant cells. The cell wall is considered to be a “nonliving” part of the cell, since it does not take part in any of the life functions of the cell. The cell wall is made up chiefly of a carbohydrate called cellulose, is relatively rigid, and provides shape and support for the cell.

Questions

1. What are the functions of the cell wall?
2. What are cell walls composed of?
3. What type of cells have cell walls?

chloroplast

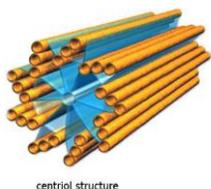


Chloroplasts, found only in plant cells and in some protists, contain the green pigment *chlorophyll*, which carries on the process of photosynthesis. In photosynthesis, radiant energy is used for the manufacture of food in the form of glucose sugar.

Questions

1. The source of energy for photosynthesis is _____.
2. The most important pigment in chloroplast is _____.

Centrioles



The main function of the *centriole* is to help with cell division in animal cells. The *centrioles* help in the formation of the spindle fibers that separate the chromosomes during cell division (mitosis).

1. What type of cells contain centrioles?
2. What process are centrioles involved in?