Section Summary

Like a prokaryotic cell, a eukaryotic cell has a plasma membrane and cytoplasm. The cytoplasm is made of two parts: the cytosol and the cytoskeleton.

The cytoskeleton has three different types of protein elements. Microfilaments provide rigidity and help shape the cell. Intermediate filaments bear tension and anchor the nucleus and other organelles in place. Microtubules help the cell resist compression and serve as tracks for motor proteins that move vesicles through the cell. They are also the structural elements of centrosomes, flagella, and cilia.

Exercises

1. Which of the following would not be considered part of the cytoskeleton?
    a. intermediate filaments
    b. flagella
    c. cytosol
    d. centrosomes

2. Which type of lipid forms the base structure of the plasma membrane?
    a. fats
    b. phospholipids
    c. oils
    d. wax

3. Describe the parts of the cytoplasm.

Answers

1. (c)
2. (b)
3. The cytoplasm is made up of two parts: the cytosol and the cytoskeleton. The cytosol contains organelles, cytoskeleton, and various chemicals. The cytoskeleton is a network of protein fibers that helps the cell maintain its shape, secures individual organelles in specific positions, and allows vesicles to move within the cell.

Glossary

centrosomes: specialized microtubules that pull chromosomes to their poles during cell division

cilium: (plural: cilia) a short, hair-like structure that extends from the plasma membrane in large numbers and is used to move an entire cell or move substances along the outer surface of the cell

cytoplasm: the entire region between the plasma membrane and the nuclear envelope, consisting of organelles suspended in the gel-like cytosol, the cytoskeleton, and various chemicals

cytoskeleton: the network of protein fibers that collectively maintain the shape of the cell, secures some organelles in specific positions, allows cytoplasm and vesicles to move within the cell, and enables unicellular organisms to move

cytosol: the gel-like material of the cytoplasm in which cell structures are suspended

flagellum: (plural: flagella) the long, hair-like structure that extends from the plasma membrane and is used to move the cell

intermediate filaments: fibers of the cytoskeleton that are of intermediate diameter and have structural functions, such as maintaining the shape of the cell and anchoring organelles

microfilaments: the thinnest of the cytoskeletal fibers and function in moving cellular components and maintaining cell structure

microtubules: the thickest fibers that make up the cytoskeleton and can dissolve and reform quickly.

plasma membrane: a phospholipid bilayer with embedded (integral) or attached (peripheral) proteins that separates the internal contents of the cell from its surrounding environment

4.4 Eukaryotic Cell Organelles

Learning objectives

By the end of this section, you will be able to:

- *Identify organelles that can be found in cells*
- *Know which organelles are part of the endomembrane system*
- *Summarize the functions of all major cell organelles*
- *Know which organelles are used to generate energy*
- *Identify which organelles are used during protein synthesis*
- *Be able to define and explain all bolded terms*

Unlike prokaryotic cells, eukaryotic cells have a membrane-bound nucleus and numerous membrane-bound organelles. Such organelles include the endoplasmic reticulum, Golgi apparatus, chloroplasts, mitochondria, and others (Figure 4.18). The word “organelle” means “little organ” and organelles have specialized cellular functions just as your body's organs have specialized functions.