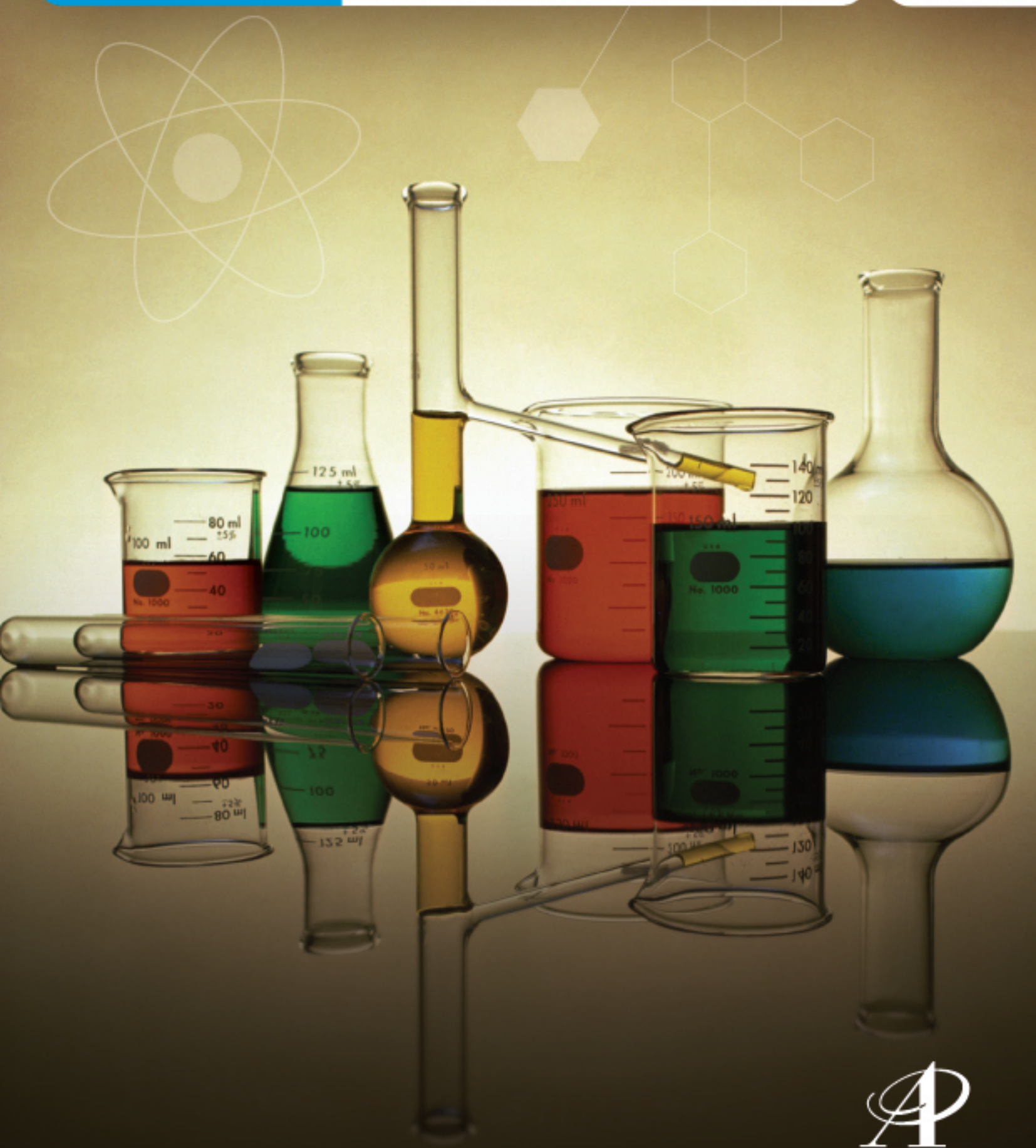




LIFE·PAC<sup>®</sup>

Science



Alpha Omega Publications<sup>®</sup>

**SCIENCE 501  
CELLS  
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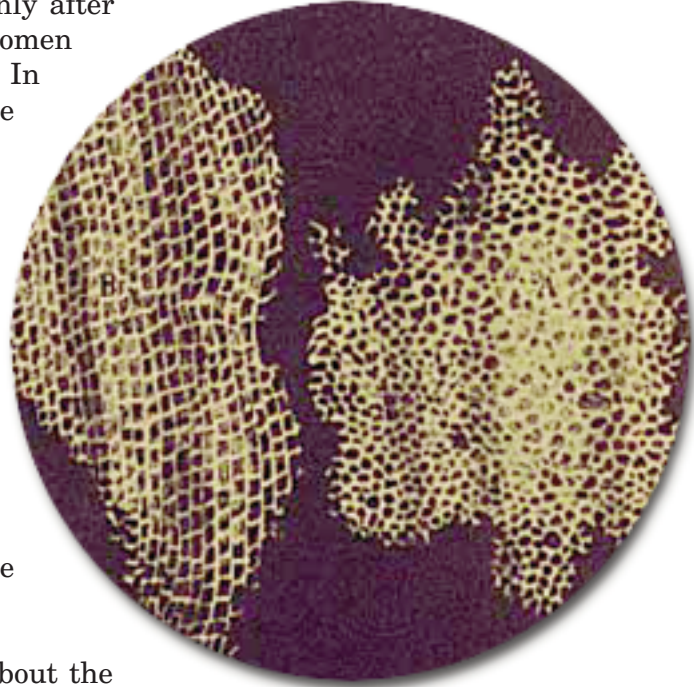
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## INTRODUCTION

In the Book of Genesis, we read that God created everything that is, including all living things. In this LIFE PAC®, you will explore the tiny unit that God made part of all living things. This tiny unit that is part of all living things is called a cell. All living things that God has created contain cells.

Because most cells are so tiny, they can only be seen with the aid of a microscope. Therefore, it was only after microscopes were invented that men and women were able to explore the tiny world of cells. In 1665 an Englishman named Robert Hooke examined a slice of cork under a crude microscope. He noticed that the cork was made up of small chambers that were similar in appearance. He called these small units “cells.” Later, other people discovered more information about cells. They discovered new information about the makeup of cells, the types of cells, and the ways that cells grow and divide. They discovered much about the work and energy processes that take place within cells. Scientists are still making new discoveries today about cells and the fascinating things that happen in them.



In this LIFE PAC you will also learn much about the makeup, types, and growth of cells. As you explore the fascinating world of cells, think about the wonderful work of God in making such tiny, complex, and orderly units to be part of all living things. Like King David in Psalm 143:5, you can think about the wonderful work of God’s hands in creating such a great variety of cells: “I meditate on all thy works; I muse on the work of thy hands.”

Before beginning your study of cells, write below some things that you have heard or read about cells.

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List below some questions that you have about cells.

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## OBJECTIVES

**Read these objectives.** These objectives tell what you should be able to do when you have completed this LIFEPAAC.

When you have finished this LIFEPAAC, you should be able to:

1. Give a basic definition of a cell and explain what a cell is.
2. Use a microscope to examine examples of different types of cells.
3. Label the different basic parts of a cell.
4. Identify different types of cells.
5. Explain in more detail the make-up of the cell membrane, cytoplasm, and nucleus.
6. Examine some unique characteristics of plant and animal cells.
7. Examine types of plant and animal tissues.
8. Define what energy is and explain how plants and animals receive and produce energy.
9. Explain how cells reproduce and grow.

## VOCABULARY

**Study these new words.** Learning the meaning of these words and their pronunciations will help you read and understand this LIFEPAAC better.

**antibodies** (an' ti bod' ēz). Proteins that destroy bacteria, viruses, and other invaders of the body, or make them harmless.

**bacteria** (bak tir' ē ə). Simple organisms that consist of one cell. They are a type of prokaryote cells (no nucleus). Bacteria are among the smallest living things.

**budding** (bud' ing). A form of cell reproduction in plants.

**cell** (sel). The basic unit of all living things.

**cell membrane** (sel mem' brān) The thin-layer outer structure of each cell that completely surrounds the cell and holds the other contents of the cell within it.

**cellulose** (sel' yə lōs). A substance that forms the walls of plant cells.

**cell wall** (sel wōl). A non-living chemical produced by the plant's cells. It surrounds the cell outside the cell membrane. It is harder than the cell membrane.

**chlorophyll** (klōr' ə fil). The green pigment in a plant cell chloroplast that gives the plant a green color.

**chloroplast** (klōr' ə plast). An organelle found in the cytoplasm of plant cells that contain chlorophyll and is involved in energy production in the cell.

**chromatin** (krō m/e/ t/e/n). The long strands of material within the nucleus made up of DNA, RNA, and other proteins

**chromosomes** (krō mə sōmz). The orderly strands of chromatin that form when a cell is going to reproduce.

**columnar** (kō lum' nār). Column shaped.

**cytoplasm** (sī' tō plaz' um). The fluid material (mainly water) within the cell membrane that does not include the nucleus.

**DNA**, or **Deoxyribonucleic Acid** (de oxy ri bo nu cle ic acid). A very large, complex molecule that forms a double-helix shape and is contained in the chromatin of cells.

**elongated** (i lōng' gāt id). A long, stretched-out shape.

**energy** (en' ə r jē). The capacity to do work. Both plants and animals need energy to do their work.

**epidermal** (ep' ə der' mul). The outside layer of cells covering plants.

**epithelial** (ep' ə thē' lē ul). A layer of cells that form the skin and the linings of various inner organs and glands.

**eukaryote** (yū kar' ē ot). The type of cell that contains three basic parts: the cell membrane, the cytoplasm, and the nucleus.

**genes** (jēnz). Part of the DNA within the cell. Genes are like “recipes” for making specific types of proteins in the cell.

**microscopic** (mī' krə' skop' ik). Very small. A microscope is needed to see something microscopic.

**mitosis** (mī tō' sis). A process of cell reproduction whereby a single cell splits apart to form two new cells.

**multicellular** (mul' tī sel' yū lur). Contains more than one cell, usually many cells.

**organelles** (or' gə nelz'). Tiny sub-parts of material within the cytoplasm of a cell that produce proteins, energy, or perform a specialty function.

**nuclear membrane** (nü' klē ər mem' brān). An outer, double-membrane covering for the material within the nucleus.

**nucleus** (nü' klē us). The command center that controls the life and activity of the cell. It is located within the cytoplasm of the cell.

**nucleolus** (nü' klē ō lus). A small part within the nucleus that is very condensed chromatin and consists mainly of RNA and other proteins.

**phospholipid** (fos' fō li pid). A molecule that forms most of the material for the cell membrane and the nuclear membrane. It forms a double layer to make the cell membrane and four layers on the nuclear membrane.

**photosynthesis** (fō' tō sin' thə sis). A very important process in plants that takes energy from sunlight and the chlorophyll in the plant and forms oxygen and sugars from carbon dioxide and water.

**prokaryote** (prō kar' ē ot). The type of cell that contains only two basic parts: the cell membrane and protoplasm. It does not have a nucleus. Bacteria are an example of this cell.

**protoplasm** (pro' tə plaz' əm). The inner fluid material within the cell membrane.

**protozoan** (pro' tə zo' un). One-celled animals.

**proteins** (prō tēnz). Large, complex molecules made up of smaller units called amino acids. All proteins contain carbon, hydrogen, nitrogen, and oxygen. They may also contain other elements. Proteins are important in the life and activities of cells.

**reproduction** (rē' prə duk' shən). The process by which cells make new cells like themselves.

**respiration** (res' pə rā' shən). A process by which cells combine oxygen with food and give off carbon dioxide and energy.

**RNA**, or **Ribonucleic Acid** (ri bo nu cle ic acid). A complex molecule similar to DNA that plays an important role in making the proteins within cells.

**tissues** (tish' ūz). A group of similar cells connected together that perform similar work.

**unicellular** (yü' nə sel' yə lur). One-celled. Living things that have only one cell.

**xylem** (zi' lum). The connective tissues in plants that help carry materials through the plant.

**Note:** These words appear in **boldface** print the first time they are used in this LIFEPAAC. If you are unsure of the meaning when you are reading, restudy the definition given in this LIFEPAAC.

# I. THE BASIC UNITS OF LIVING THINGS: CELLS

## WHAT IS A CELL?

**Definition.** A **cell** is the basic unit of all living things. It is the unit of life. Some living things consist of only one cell. They are called **unicellular** (one-celled). Other living things consist of more than one cell. They are called

**multicellular** (many-celled). All plants and animals are multicellular. God provided his creation with a great variety of cells! Yet, as you will learn, all cells have some things in common.

**Review these objectives.** When you have completed this section, you should be able to:

1. Give a basic definition of a cell and explain what a cell is.
2. Use a microscope to examine examples of different types of cells.
3. Label the different basic parts of a cell.
4. Identify different types of cells.

**Restudy these words.** They will appear for the first time in Section I of this LIFEPAAC.

bacteria	columnar	microscopic	protoplasm
cell	cytoplasm	multicellular	unicellular
cell membrane	elongated	nucleus	
cell wall	eukaryote	prokaryote	



**Write the answers on the lines.**

- 1.1 All living things that God has created contain \_\_\_\_\_.
- 1.2 An Englishman named Robert Hooke examined \_\_\_\_\_ under a crude microscope and called the small chambers “cells.”
- 1.3 A cell is the \_\_\_\_\_ of all living things.
- 1.4 A one-celled living thing is called \_\_\_\_\_.
- 1.5 A many-celled living thing is called \_\_\_\_\_.

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**Basic parts of a cell.** All cells have at least two basic parts: (1) a **cell membrane**, and (2) an inner material called **protoplasm**. This inner material called protoplasm is usually a fluid or jelly-like substance, although in some cells it is harder than jelly. Cells that contain *only* these two parts — an outer membrane and the inner protoplasm — are called **prokaryote** cells. The living things called **bacteria** are examples of these two-part prokaryote cells.

Many other cells contain a third basic part: a **nucleus**. The nucleus is part of the protoplasm of the cell and is located within the cell membrane. It usually looks like a little dark ball or dot within the cell. When a cell contains a nucleus, then we call the part of the protoplasm outside the nucleus the **cytoplasm**. The cytoplasm is the liquid or jelly-like substance within the cell membrane and outside the nucleus, while the nucleus consists of harder living substances. Therefore, these cells