

SECTION 4

OBJECTIVES

- Describe the structure of the nucleic acids DNA and RNA.
- Explain the functions of DNA and RNA in the cell.
- Describe applications of modern gene technology.

Nucleic Acids

Nucleic acids contain all of the genetic information of an organism. They are the means by which a living organism stores and conveys instructional information for all of its activities. They are also the means by which an organism can reproduce. The two nucleic acids found in organisms are *deoxyribonucleic acid (DNA)* and *ribonucleic acid (RNA)*.

Nucleic Acid Structure

A **nucleic acid** is an organic compound, either RNA or DNA, whose molecules carry genetic information and is made up of one or two chains of monomer units called nucleotides. However, unlike the monomer units in polysaccharides and polypeptides, each nucleotide monomer can be further hydrolyzed into three different molecules. A nucleotide molecule is composed of a five-carbon sugar unit that is bonded to both a phosphate group and a cyclic organic base containing nitrogen.

The sugar unit in DNA is deoxyribose, and the sugar unit in RNA is ribose. The diagram below shows the sugar-phosphate arrangement in three nucleotides.

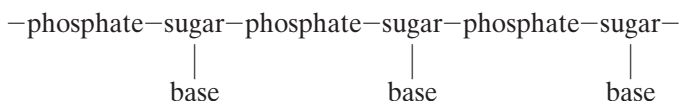


FIGURE 20 There are five common nitrogenous bases. Thymine (T), cytosine (C), and uracil (U) have a single six-member ring. Adenine (A) and guanine (G) have a six-member ring connected to a five-member ring.

The five nitrogenous bases found in nucleic acids are shown in **Figure 20**. *Adenine (A)*, *guanine (G)*, and *cytosine (C)* are found in both DNA and RNA. *Thymine (T)* is found only in DNA, and *uracil (U)* is found only in RNA.

