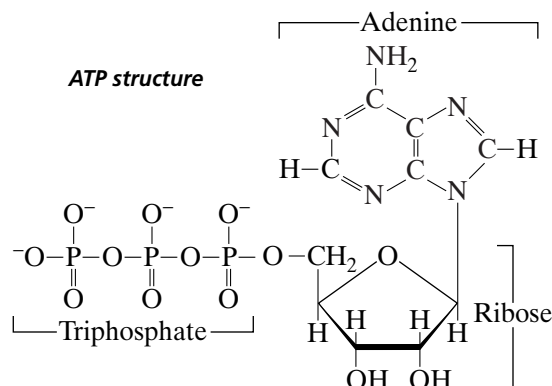


Nucleic Acids

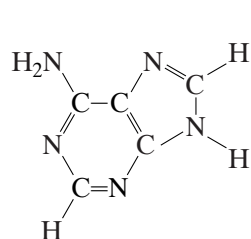
Nucleic acids are macromolecules that transmit genetic information. Deoxyribonucleic acid (DNA) is the material that contains the genetic information that all organisms pass on to their offspring during reproduction. This information includes instructions for making proteins as well as for making the other nucleic acid, ribonucleic acid (RNA). Ribonucleic acid (RNA) assists in protein synthesis by helping to coordinate the process of protein assembly.

Nucleotides are the monomers of nucleic acids. A nucleotide has three parts: one or more phosphate groups, a sugar containing five carbon atoms, and a ring-shaped nitrogen base, as shown below. RNA nucleotides contain the simple sugar ribose. DNA nucleotides contain deoxyribose (ribose stripped of one oxygen atom). Structures for both of these sugars are shown on page 821. Cells contain nucleotides with one, two, or three phosphate groups attached. Besides being the monomers of nucleic acids, several nucleotides play other roles. For example, adenosine triphosphate (ATP) is the

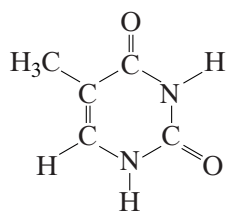


nucleotide that supplies the energy for many metabolic reactions.

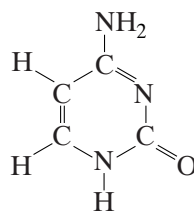
The bases in nucleic acids attract each other in pairs, a phenomenon known as base-pairing. DNA is made of four different nucleotides—those containing the bases adenine (A), thymine (T), guanine (G), and cytosine (C). The attraction between base pairs is hydrogen bonding. Adenine forms hydrogen bonds with thymine. Similarly, cytosine bonds to guanine. This base-pairing holds strands of DNA together.



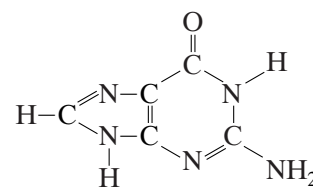
■ Adenine



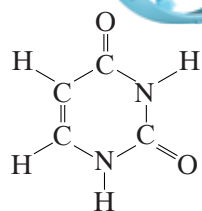
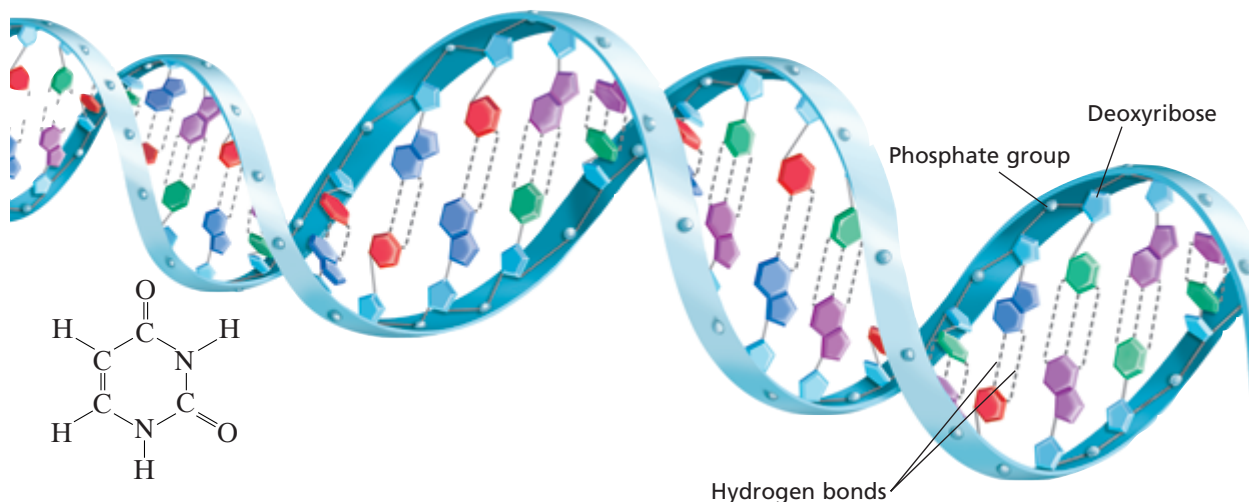
■ Thymine



■ Cytosine



■ Guanine



Uracil, RNA only