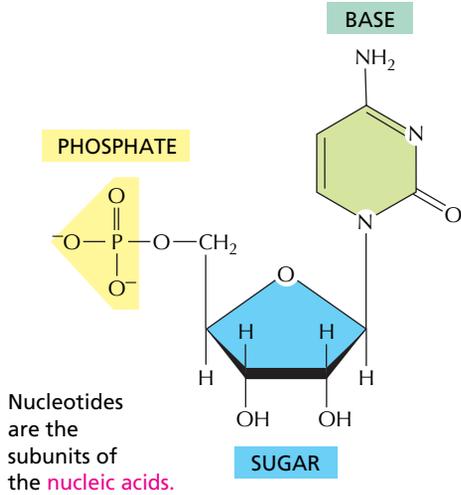


**NUCLEOTIDES**

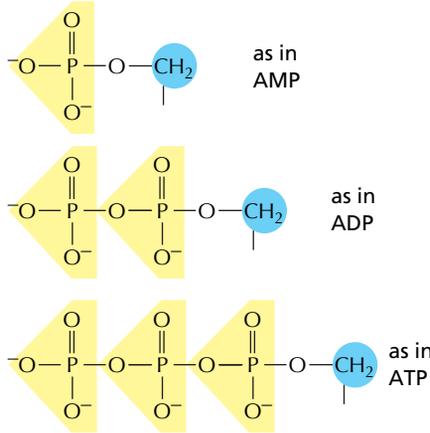
A nucleotide consists of a nitrogen-containing base, a five-carbon sugar, and one or more phosphate groups.



Nucleotides are the subunits of the **nucleic acids**.

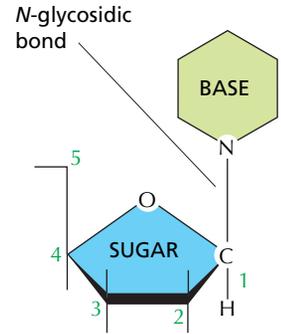
**PHOSPHATES**

The phosphates are normally joined to the C5 hydroxyl of the ribose or deoxyribose sugar (designated 5'). Mono-, di-, and triphosphates are common.



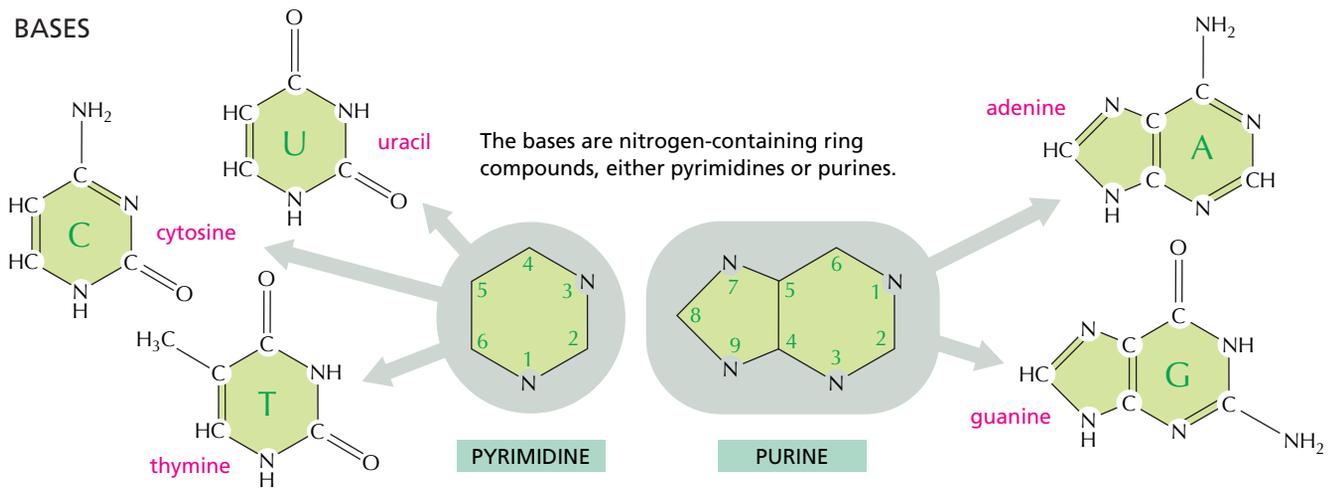
The phosphate makes a nucleotide negatively charged.

**BASIC SUGAR LINKAGE**



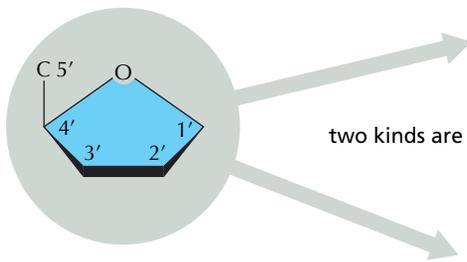
The base is linked to the same carbon (C1) used in sugar-sugar bonds.

**BASES**

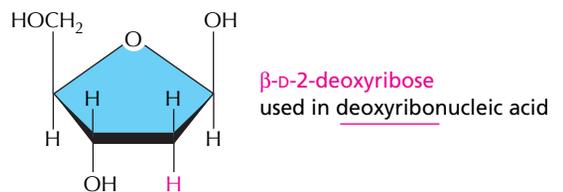
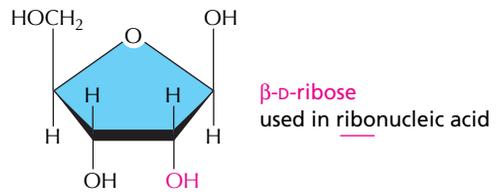


**SUGARS**

**PENTOSE**  
a five-carbon sugar



two kinds are used



Each numbered carbon on the sugar of a nucleotide is followed by a prime mark; therefore, one speaks of the "5-prime carbon," etc.

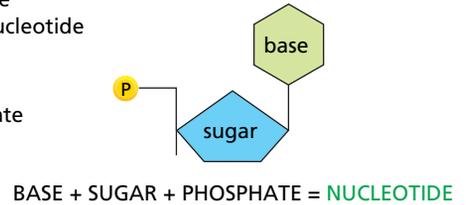
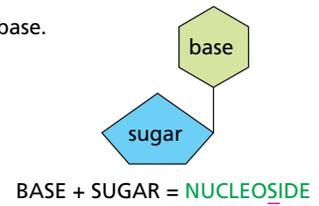
**NOMENCLATURE**

A nucleoside or nucleotide is named according to its nitrogenous base.

BASE	NUCLEOSIDE	ABBR.
adenine	adenosine	<b>A</b>
guanine	guanosine	<b>G</b>
cytosine	cytidine	<b>C</b>
uracil	uridine	<b>U</b>
thymine	thymidine	<b>T</b>

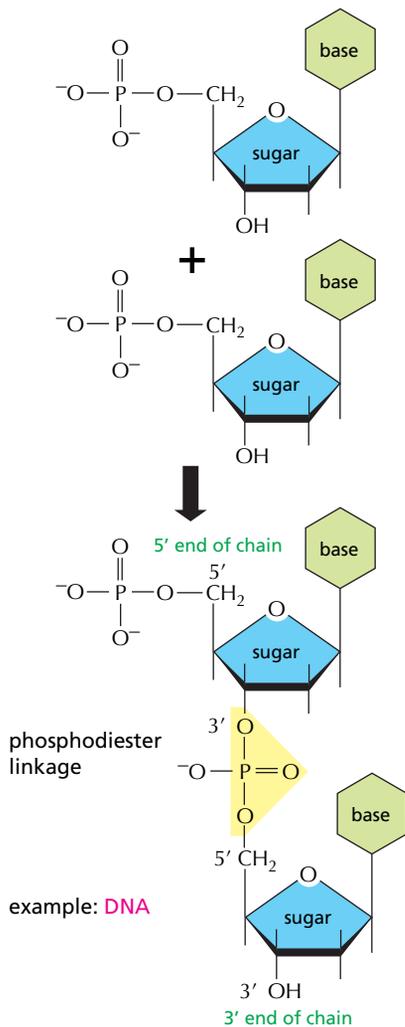
Single letter abbreviations are used variously as shorthand for (1) the base alone, (2) the nucleoside, or (3) the whole nucleotide—the context will usually make clear which of the three entities is meant. When the context is not sufficient, we will add the terms “base”, “nucleoside”, “nucleotide”, or—as in the examples below—use the full 3-letter nucleotide code.

AMP = adenosine monophosphate  
 dAMP = deoxyadenosine monophosphate  
 UDP = uridine diphosphate  
 ATP = adenosine triphosphate



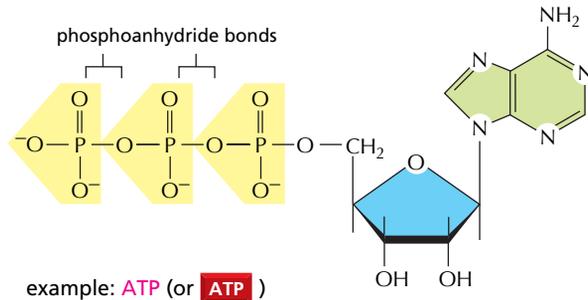
**NUCLEIC ACIDS**

Nucleotides are joined together by a **phosphodiester linkage** between 5' and 3' carbon atoms to form nucleic acids. The linear sequence of nucleotides in a nucleic acid chain is commonly abbreviated by a one-letter code, A—G—C—T—T—A—C—A, with the 5' end of the chain at the left.

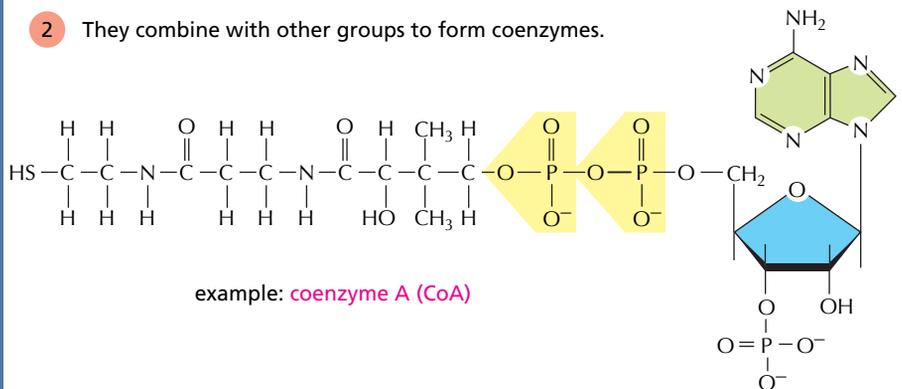


**NUCLEOTIDES HAVE MANY OTHER FUNCTIONS**

- 1 They carry chemical energy in their easily hydrolyzed phosphoanhydride bonds.



- 2 They combine with other groups to form coenzymes.



- 3 They are used as specific signaling molecules in the cell.

