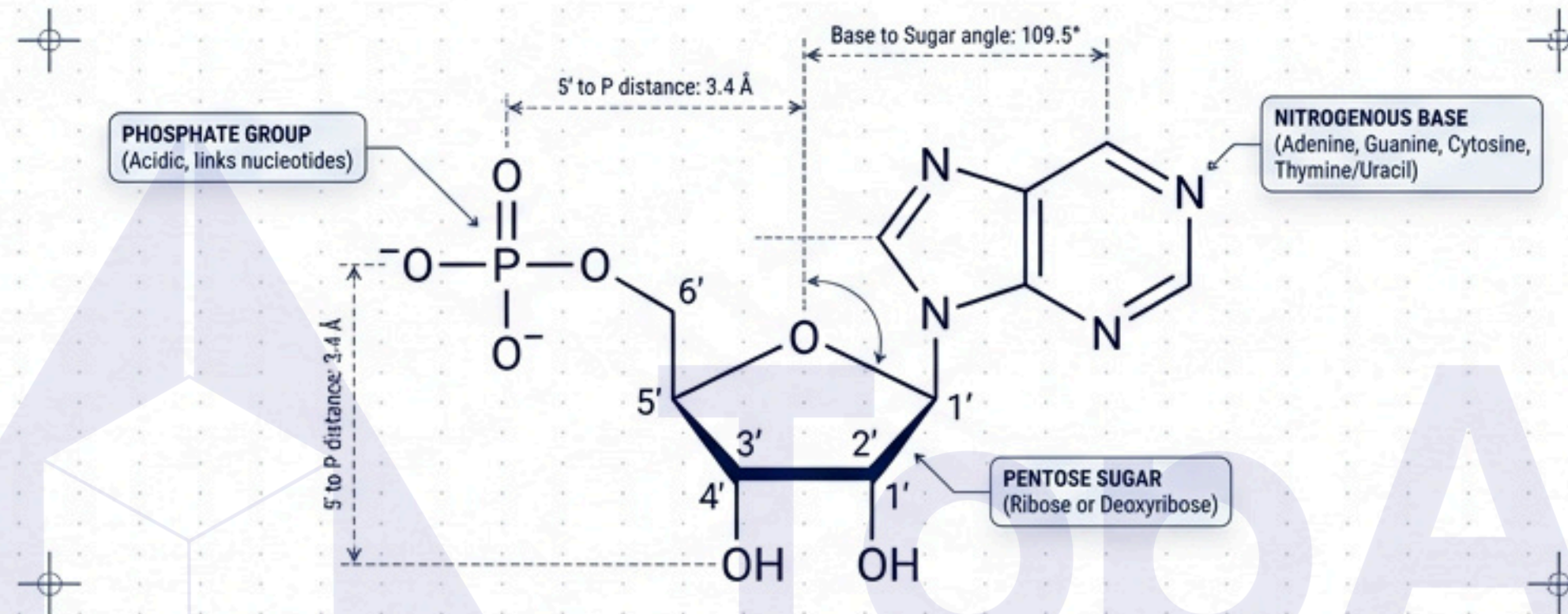
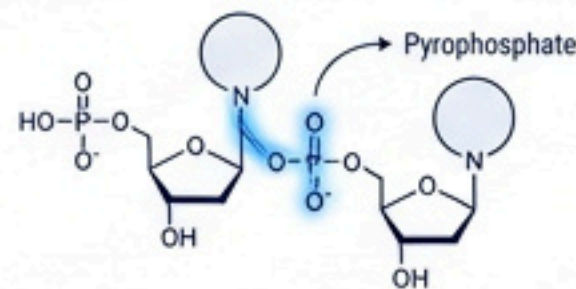


Building the Polynucleotide Chain

The Chemical Architecture of DNA and RNA

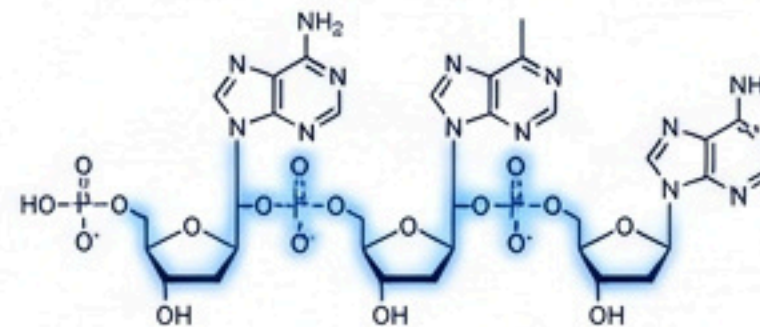


Phosphodiester Bond Formation



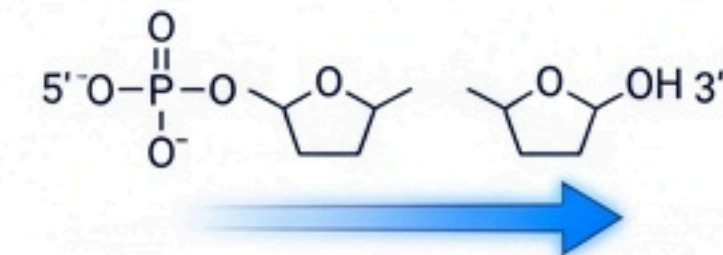
Covalent linkage between the 3'-OH of one sugar and the 5'-phosphate of the next. Forms the sugar-phosphate backbone.

Sugar-Phosphate Backbone



The repeating structural framework of DNA and RNA, providing stability and directionality (5' to 3').

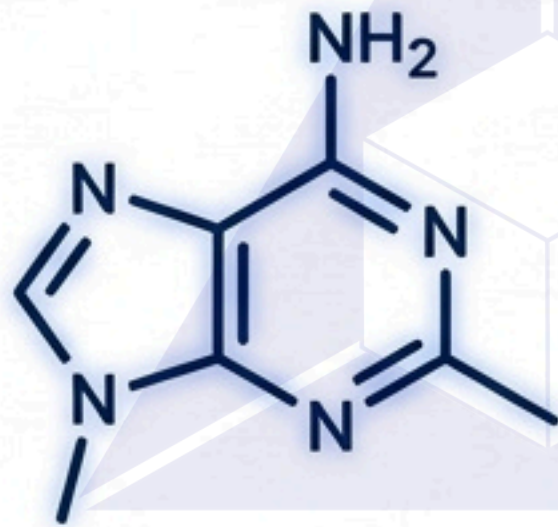
Directionality (5' -> 3')



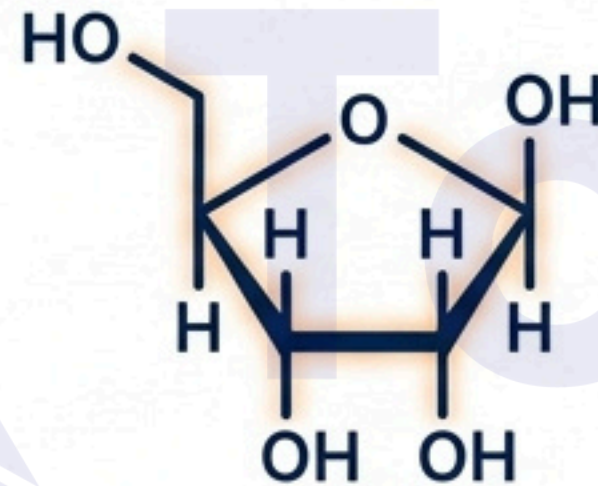
Polynucleotide chains are synthesized and read from the 5' end (phosphate) to the 3' end (hydroxyl).

The Three Core Components

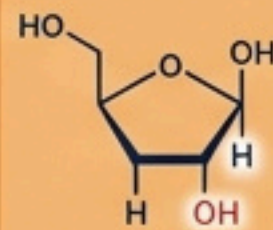
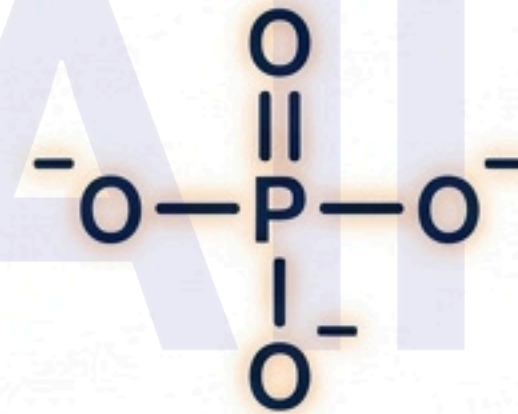
Nitrogenous Base



Pentose Sugar



Phosphate Group

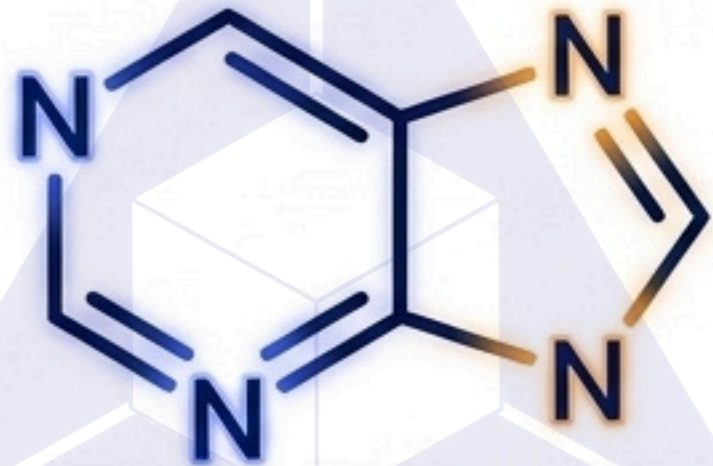


RNA uses **Ribose** (has an -OH group at the 2' position).

DNA uses **Deoxyribose** (lacks the 2' -OH group).

Classifying the Nitrogenous Bases

Purines



Adenine (A)
Guanine (G)

Pyrimidines



Cytosine (C)
Thymine (T)
Uracil (U)



Cytosine is common to both. Thymine is exclusive to DNA. Uracil replaces Thymine in RNA.



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$$E=mc^2$$



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Practice Now



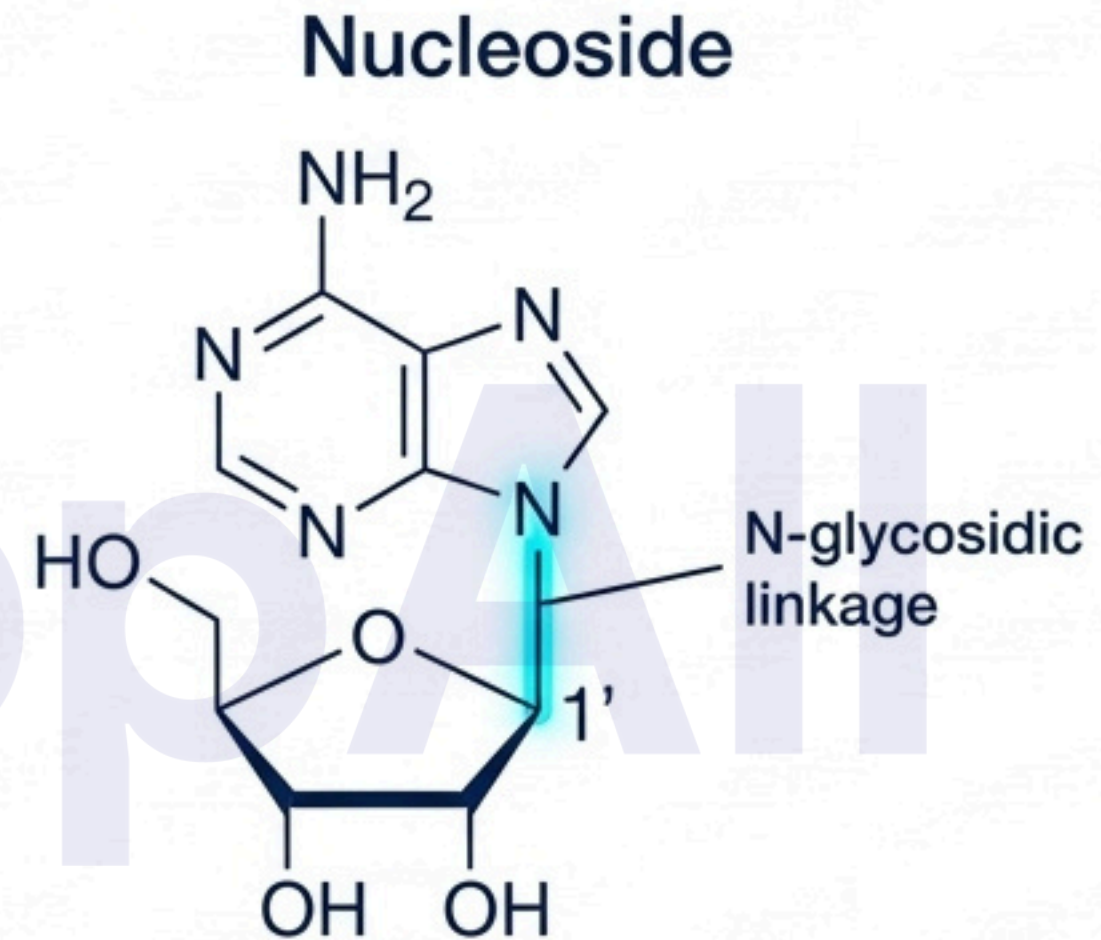
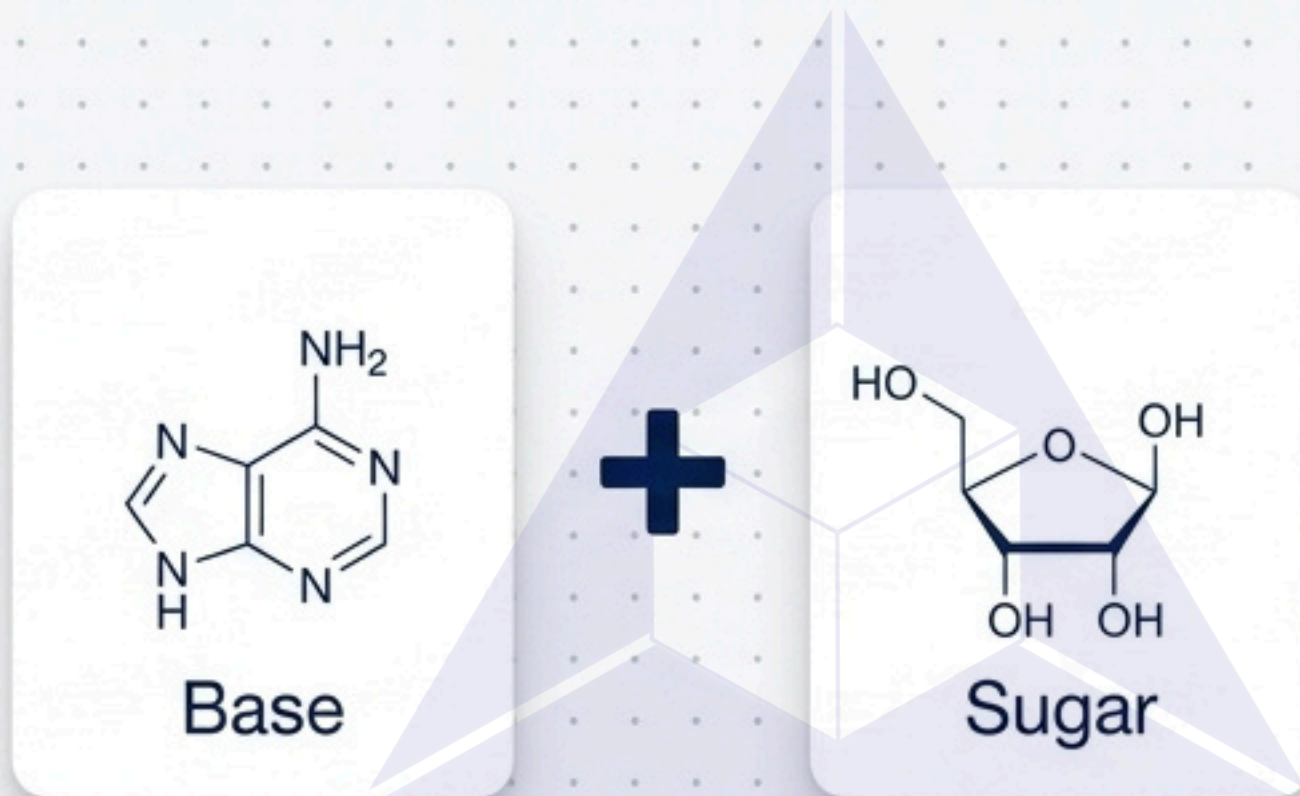
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- » Track Your Performance Smarter



Forming the Nucleoside

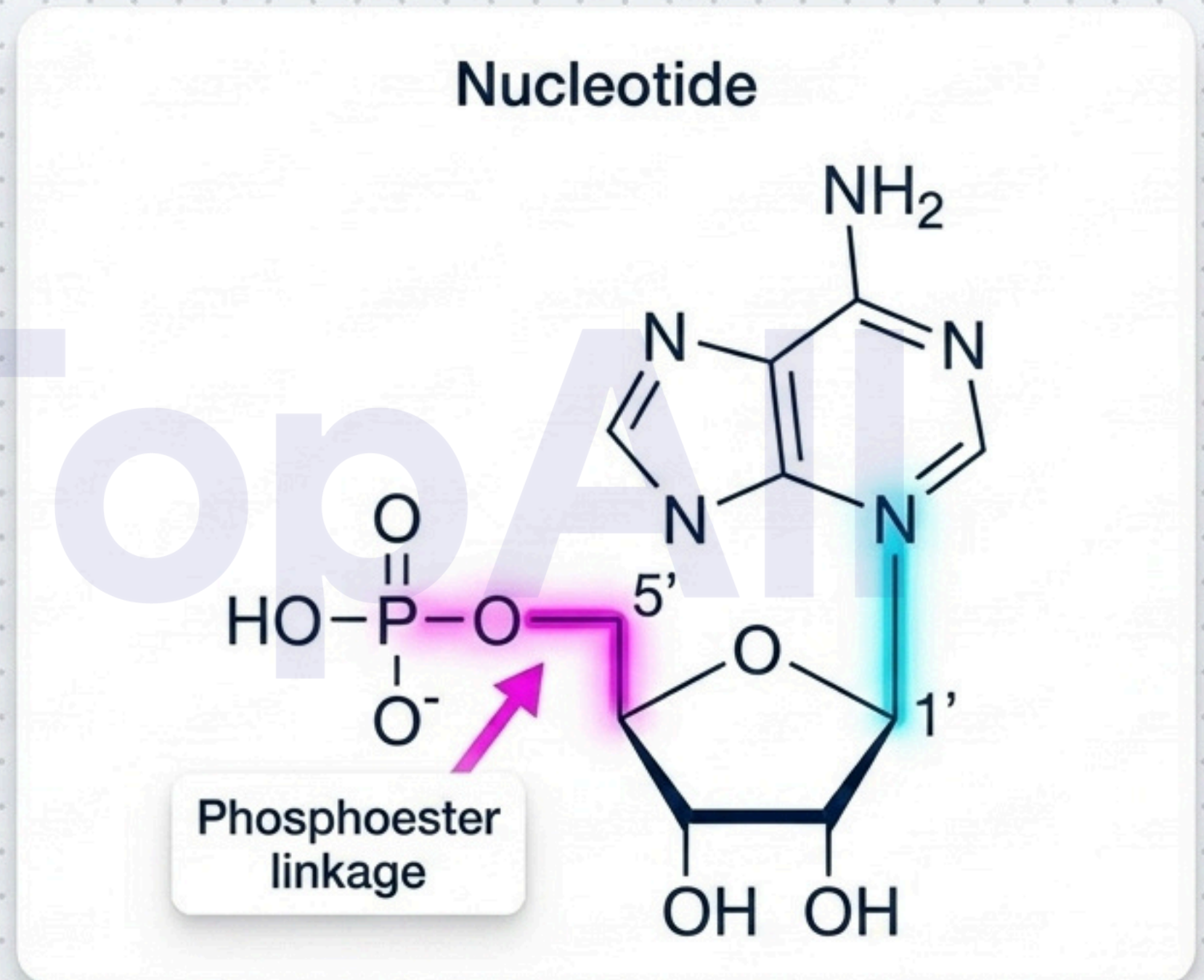
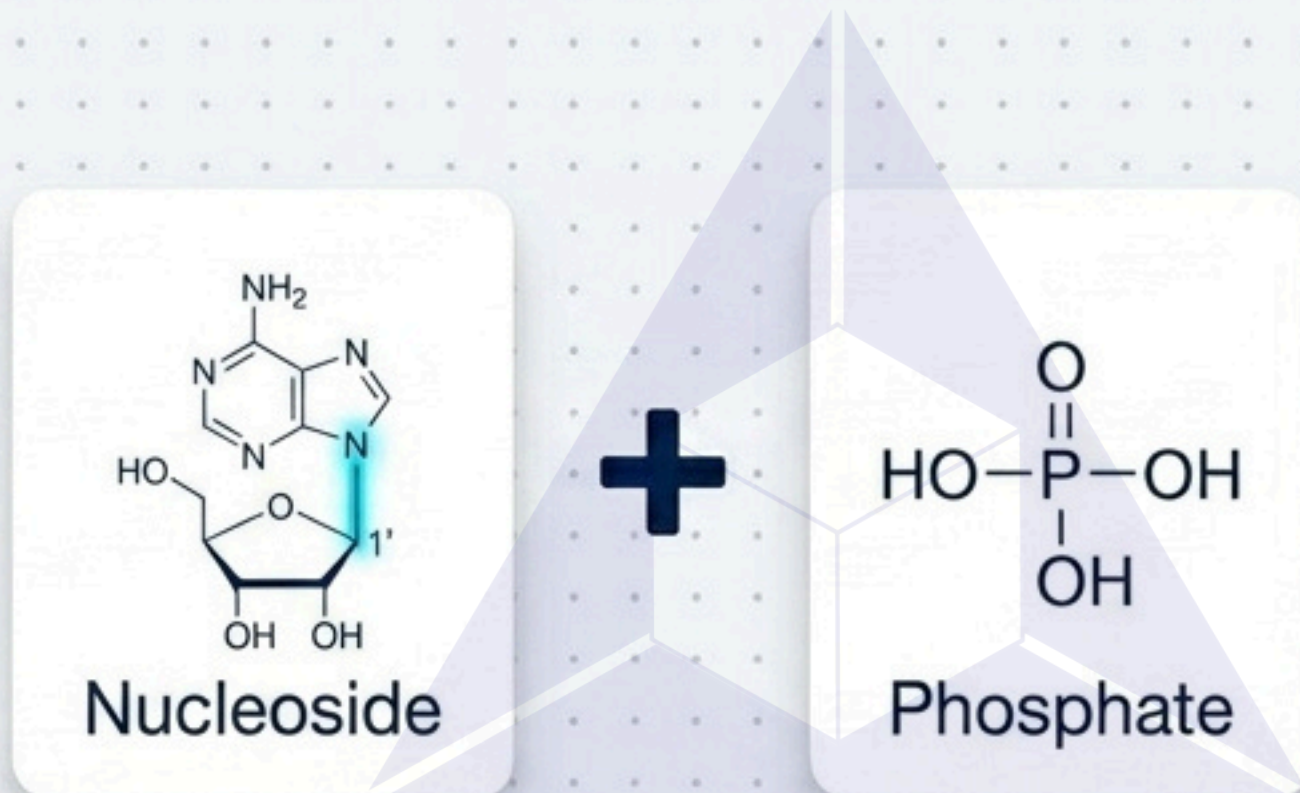


Examples: Adenosine, Guanosine, Cytidine, Uridine (RNA) /
Deoxyadenosine, Deoxyguanosine, Deoxycytidine, Deoxythymidine (DNA).



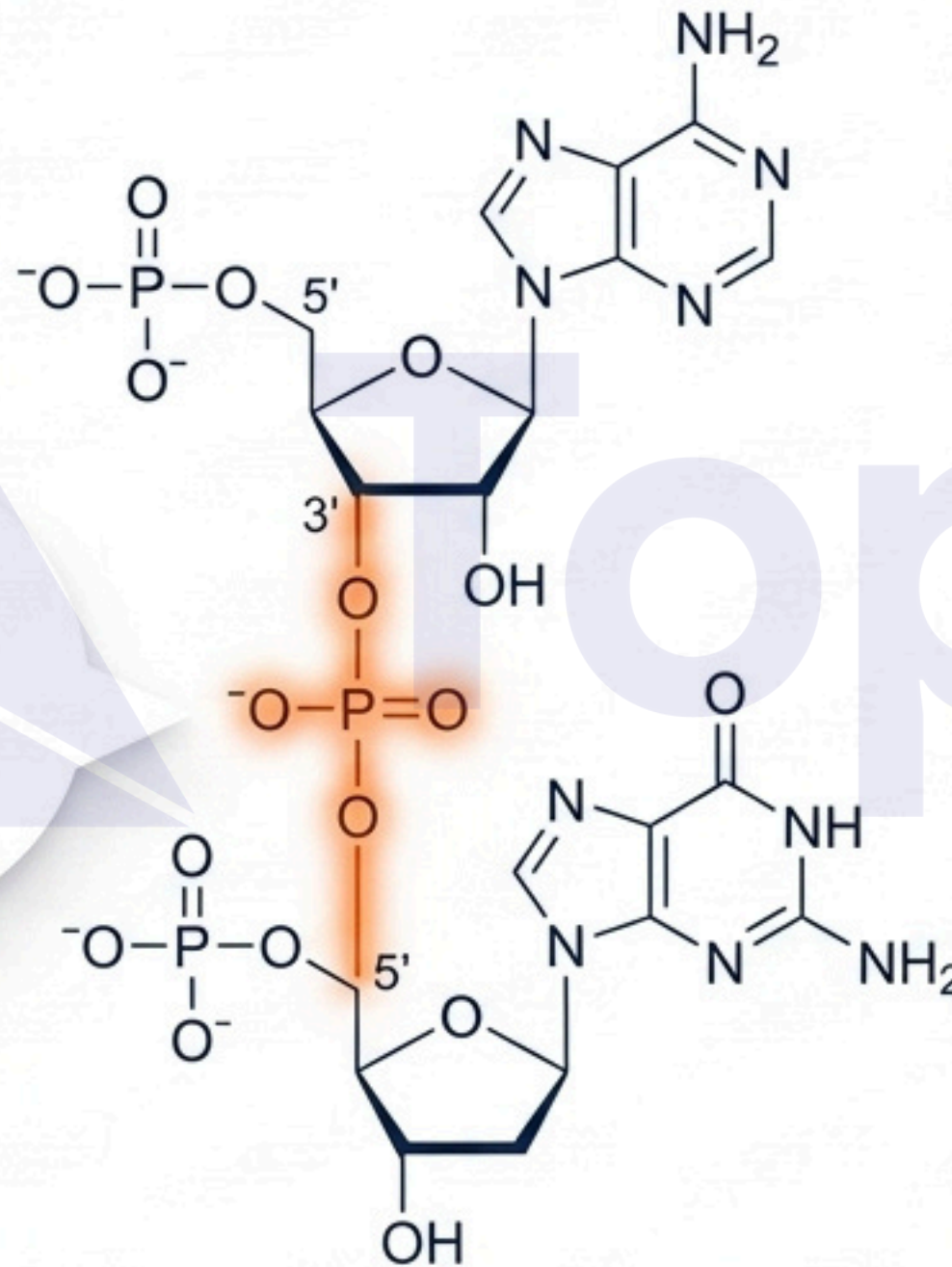
Wait! A nucleoside is NOT a nucleotide. It lacks a phosphate group. Do not confuse the two.

Completing the Nucleotide



Linking the Chain

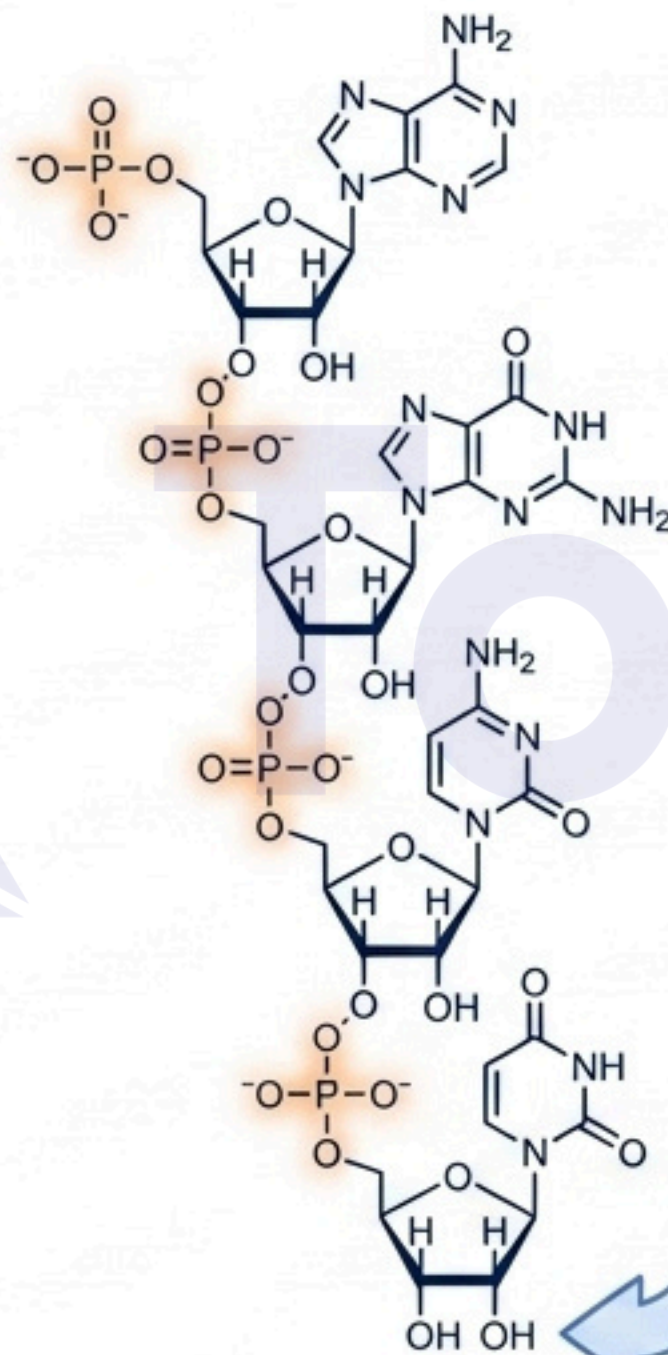
**3'-5'
Phosphodiester
Linkage**



Multiple nucleotides joined in this manner form a continuous polynucleotide chain.

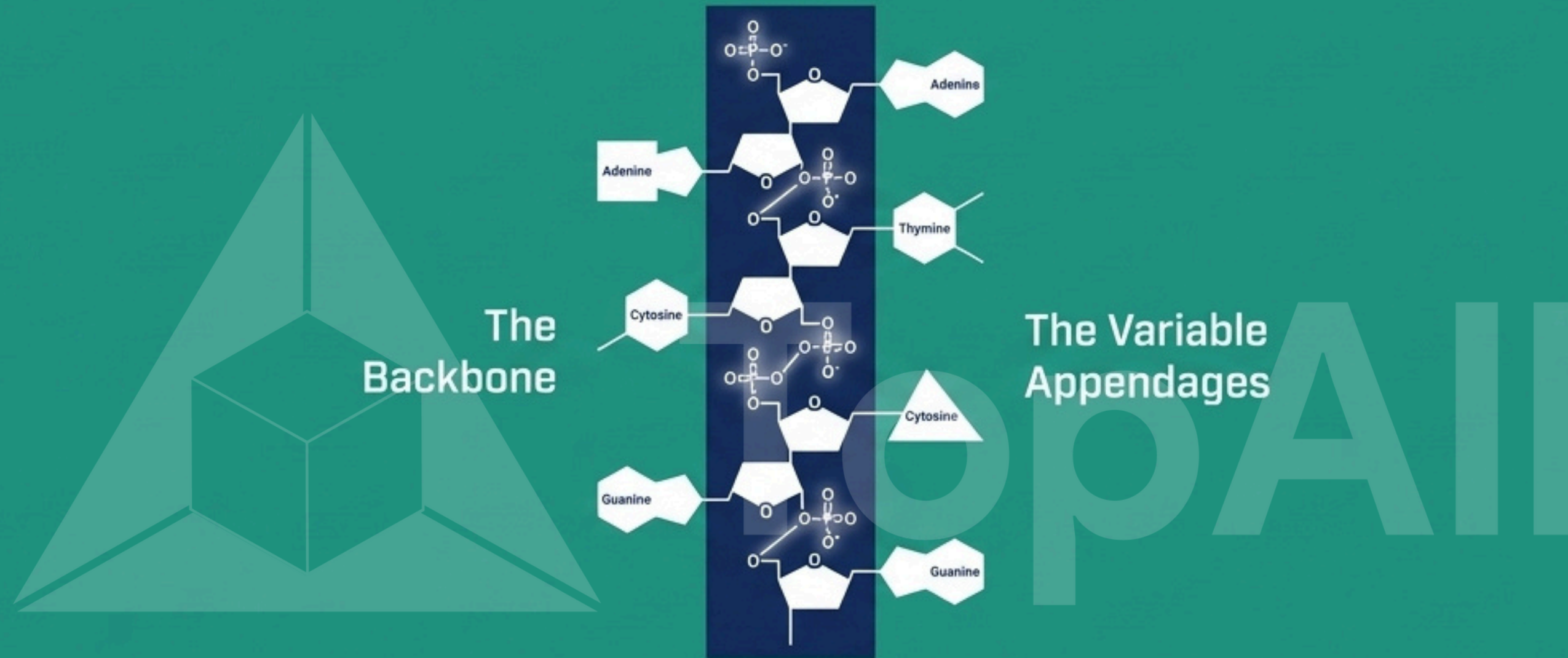
The Polynucleotide Architectural Map

5' End: Defined by a free phosphate moiety at the 5' Carbon of the terminal sugar.



3' End: Defined by a free -OH group at the 3' Carbon of the terminal sugar.

Macro-Structure Architecture



The sugar and phosphates form a structurally uniform, repeating backbone. The nitrogenous bases project outward from this backbone, creating a variable sequence that acts as the code for genetic information.



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