

Nucleic Acids

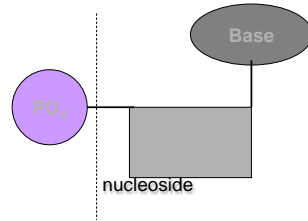
Nucleic Acids
Structures of Nucleic Acids
DNA Replication
RNA and Transcription



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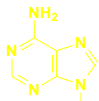
Nucleotides

Nucleic acids consist of nucleotides that have a sugar, nitrogen base, and phosphate

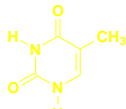


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Nitrogen-Containing Bases



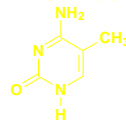
adenine (A)



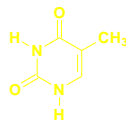
thymine (T)



guanine (G)

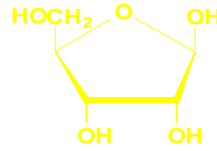


cytosine (C)

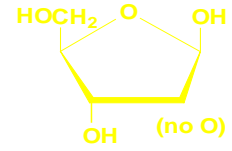


uracil (U)³

Sugars



ribose



deoxyribose (no O)

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Nucleosides in DNA

Base	Sugar	Nucleoside
Adenine (A)	Deoxyribose	Adenosine
Guanine (G)	Deoxyribose	Guanosine
Cytosine (C)	Deoxyribose	Cytidine
Thymine (T)	Deoxyribose	Thymidine

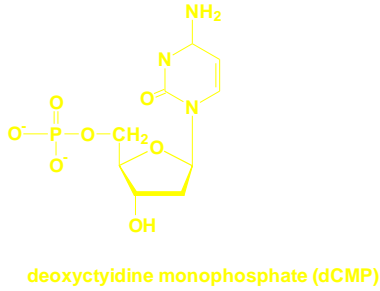
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Nucleosides in RNA

Base	Sugar	Nucleoside
Adenine (A)	ribose	Adenosine
Guanine (G)	ribose	Guanosine
Cytosine (C)	ribose	Cytidine
Uracil (U)	ribose	Uridine

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Example of a Nucleoside



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Nucleotides in DNA and RNA

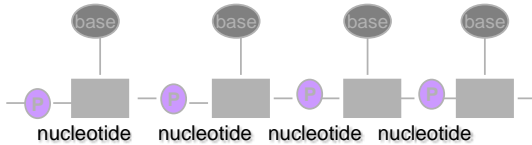
DNA	
dAMP	Deoxyadenosine monophosphate
dGMP	Deoxyguanosine monophosphate
dCMP	Deoxycytidine monophosphate
dTMP	Deoxythymidine monophosphate

RNA	
AMP	adenosine monophosphate
GMP	guanosine monophosphate
CMP	cytidine monophosphate
UMP	uridine monophosphate

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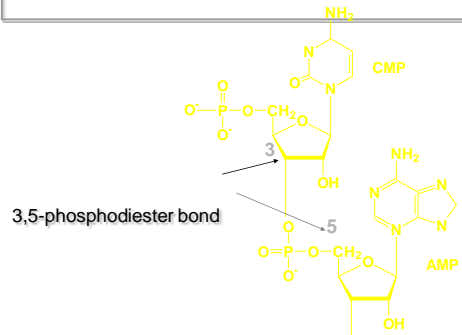
Structure of Nucleic Acids

- Polymers of four nucleotides
- Linked by alternating sugar-phosphate bonds
- RNA: ribose and A, G, C, U
- DNA: deoxyribose and A,G,C,T



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Nucleic Acid Structure



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Double Helix of DNA

- DNA contains two strands of nucleotides
- H bonds hold the two strands in a double-helix structure
- A helix structure is like a spiral stair case
- Bases are always paired as A-T and G-C
- Thus the bases along one strand complement the bases along the other

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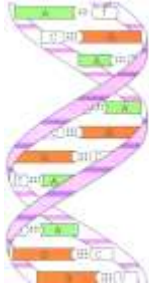
Complementary Base Pairs

- Two H bonds for A-T
- Three H bonds for G-C



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Double Helix of DNA



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Learning Check

Write the complementary base sequence for the matching strand in the following DNA section:

-A-G-T-C-C-A-A-T-G-C-

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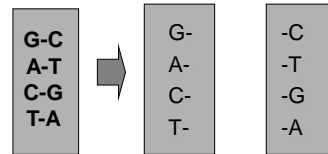
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DNA Replication

- DNA in the chromosomes replicates itself every cell division
- Maintains correct genetic information
- Two strands of DNA unwind
- Each strand acts like a template
- New bases pair with their complementary base
- Two double helices form that are copies of original DNA

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DNA Unwinds

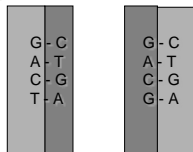


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DNA Copied with Base Pairs

- Two copies of original DNA strand

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