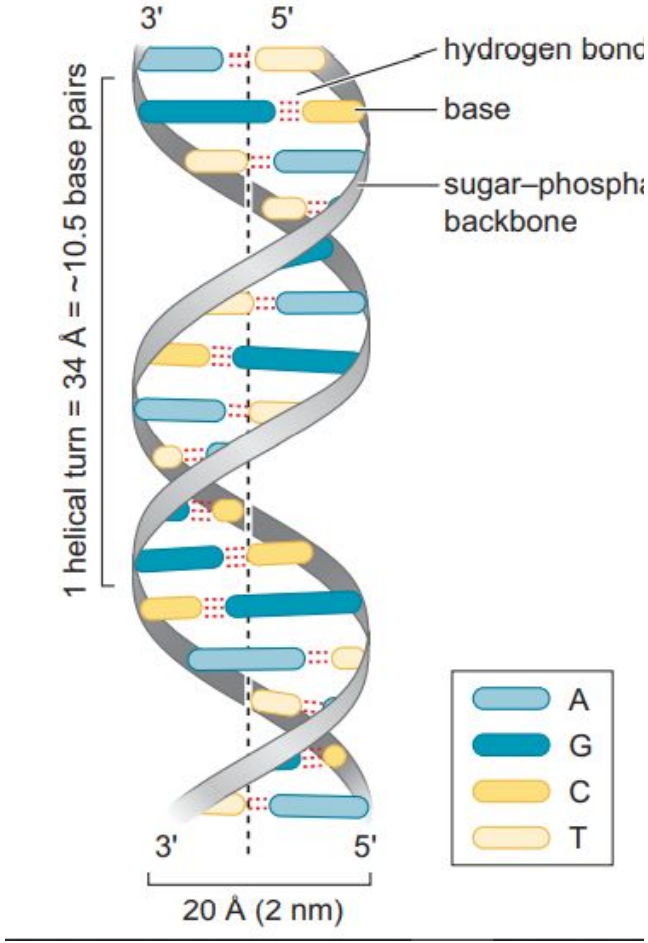
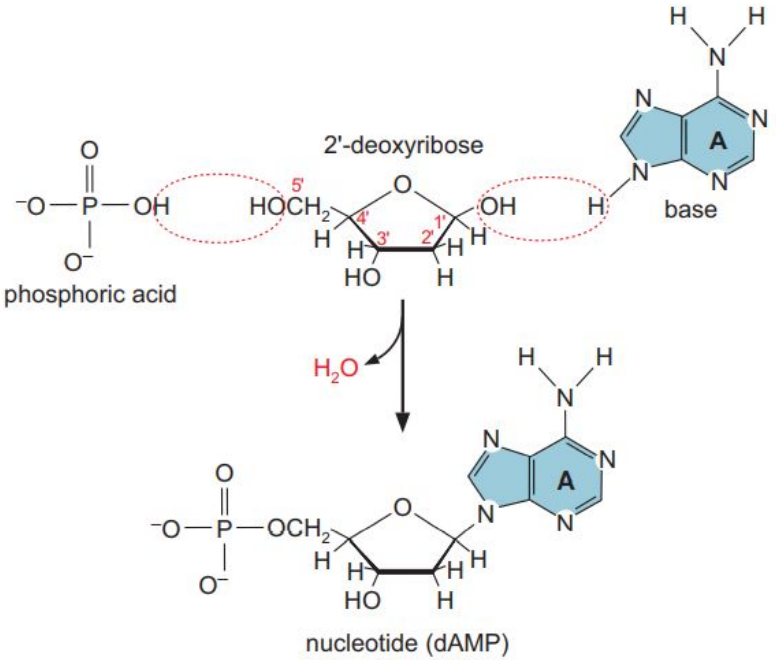
DNA Replication

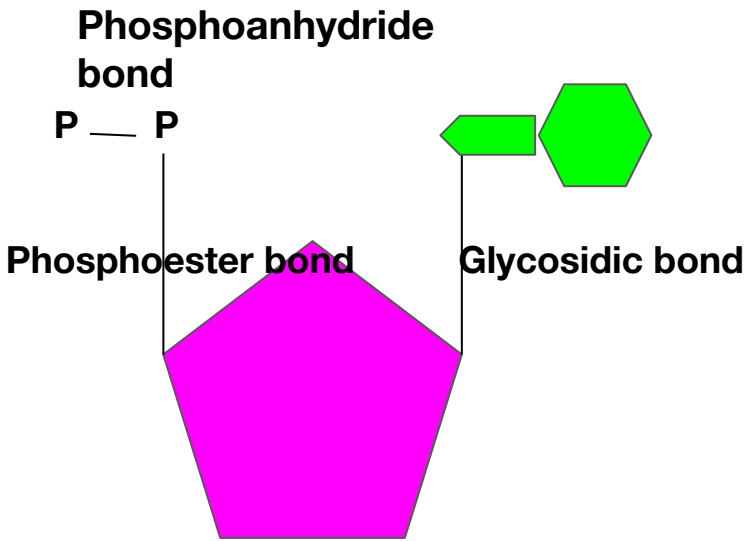
VYSAKH V G

DNA Is Composed of Polynucleotide Chains

- ➔ Composed of two polynucleotide chains
- ➔ Nucleotide: Fundamental building block of
- ➔ Phosphate joined to a sugar, 2’ -deoxyribose,
- ➔ To which base attached.
- ➔ There is no hydroxyl at position 2’

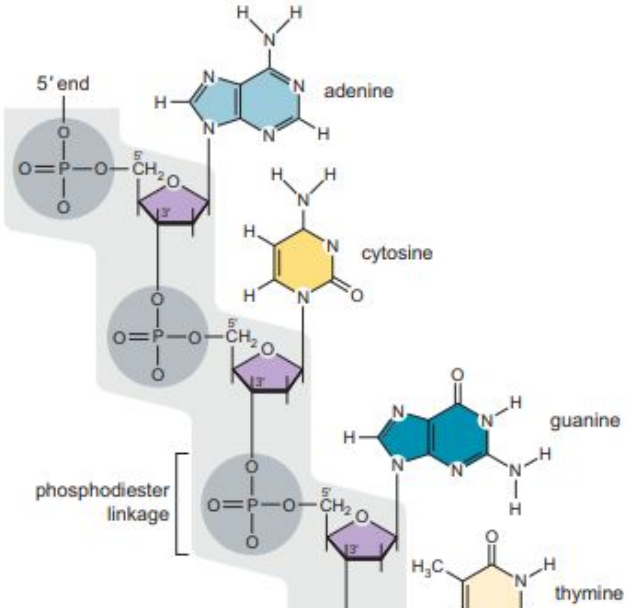

3'
5'
hydrogen bond
base
sugar–phospha
backbone
1 helical turn = 34 Å = ~10.5 base pairs
A
G
C
T
3'
5'
20 Å (2 nm)


2'-deoxyribose
phosphoric acid
base
H_2O
nucleotide (dAMP)


Phosphoanhydride bond
P
P
Phosphoester bond
Glycosidic bond

- **The sugar and base alone are called a nucleoside.**
- **Adding a phosphate to a nucleoside creates a nucleotide.**

- **Nucleotides are, joined to each other in polynucleotide chains through the 3’ -hydroxyl of 2’ -deoxyribose of one nucleotide and the phosphate attached to the 5’ -hydroxyl of another nucleotide**


5′ end
adenine
cytosine
guanine
thymine
phosphodiester linkage

- **During DNA replication, the two complementary strands of parental DNA are pulled apart.**
- **Each of these parental strands is then used as a template for the synthesis of a new complementary strand**

- **The template strand is scanned in the 3′→5′ direction**
- **The newly synthesized strand is made in the 5′ →3′ direction.**
- **The newly synthesized strand is complementary and antiparallel to the template strand**

Table 12.3 Characteristics of DNA Polymerases in *E. coli*

DNA Polymerase	5′⟶3′ Polymerization	3′⟶5′ Exonuclease	5′⟶3′ Exonuclease	Function
I	Yes	Yes	Yes	Removes and replaces primers
II	Yes	Yes	No	DNA repair; restarts replication after damaged DNA halts synthesis
III	Yes	Yes	No	Elongates DNA
IV	Yes	No	No	DNA repair
V	Yes	No	No	DNA repair; translation DNA synthesis

Thank you