



Chapter 10

Molecular Biology of the Gene

PowerPoint Lectures

Campbell Biology: Concepts & Connections, Eighth Edition

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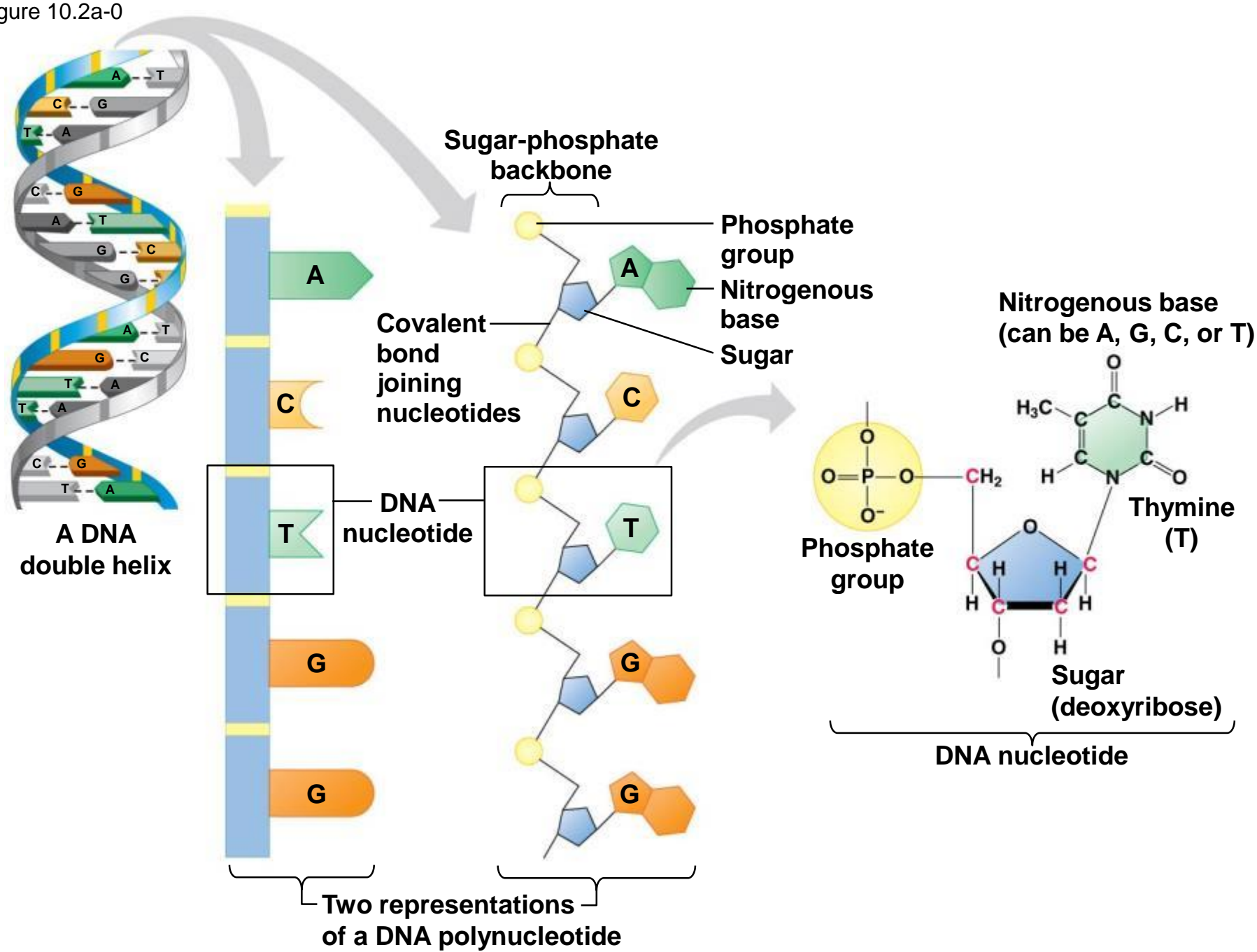
Lecture by Edward J. Zalisko

- DNA
- DNA Replication
- DNA Transcription and Translation

10.2 DNA and RNA are polymers of nucleotides

- DNA and RNA are nucleic acids consisting of long chains (polymers) of chemical units (monomers) called _____.
- One of the two strands of DNA is a DNA _____, a nucleotide polymer (chain).
- The nucleotides are joined to one another by a _____

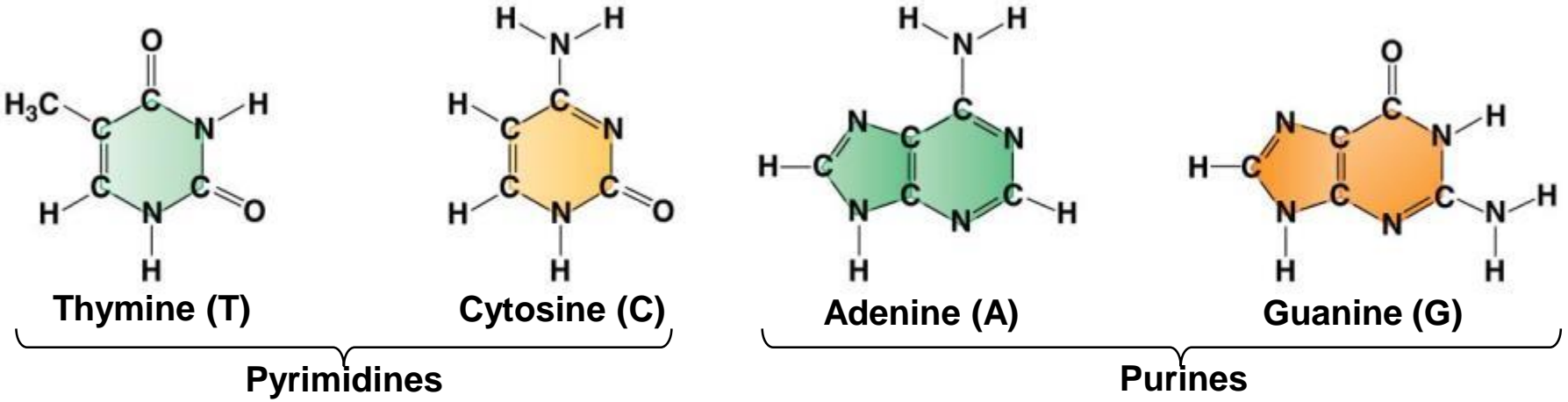
Figure 10.2a-0



10.2 DNA and RNA are polymers of nucleotides

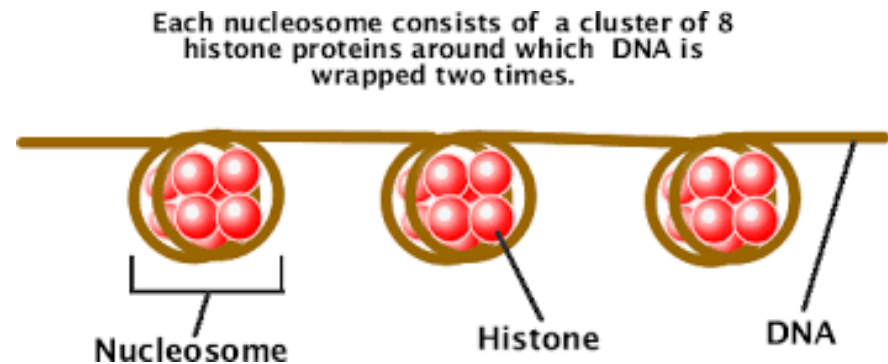
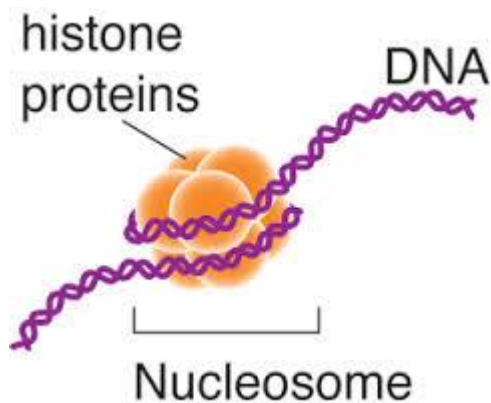
- Each type of DNA nucleotide has a different nitrogen-containing base:
 -
 -
 -
 -

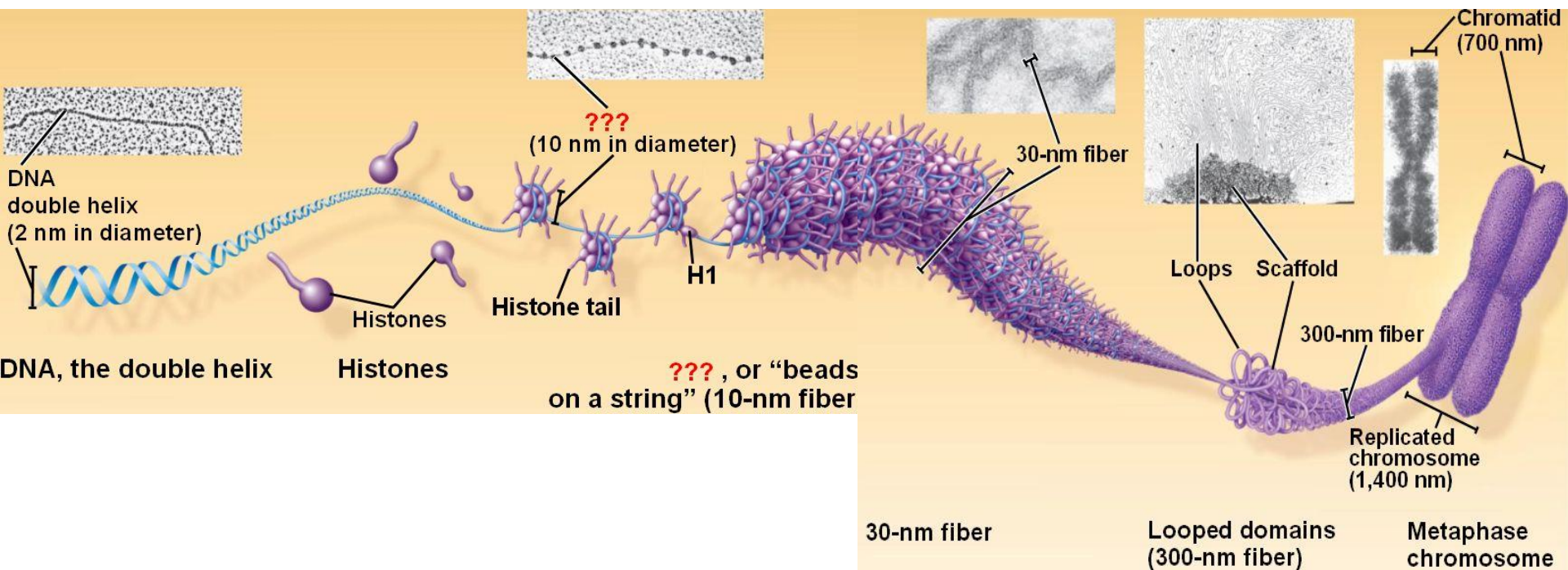
Figure 10.2b-0



DNA is wound into _____ “beads on a string”

positively charged _____ (proteins)
bond tightly to negatively charged DNA to form a
nucleosome



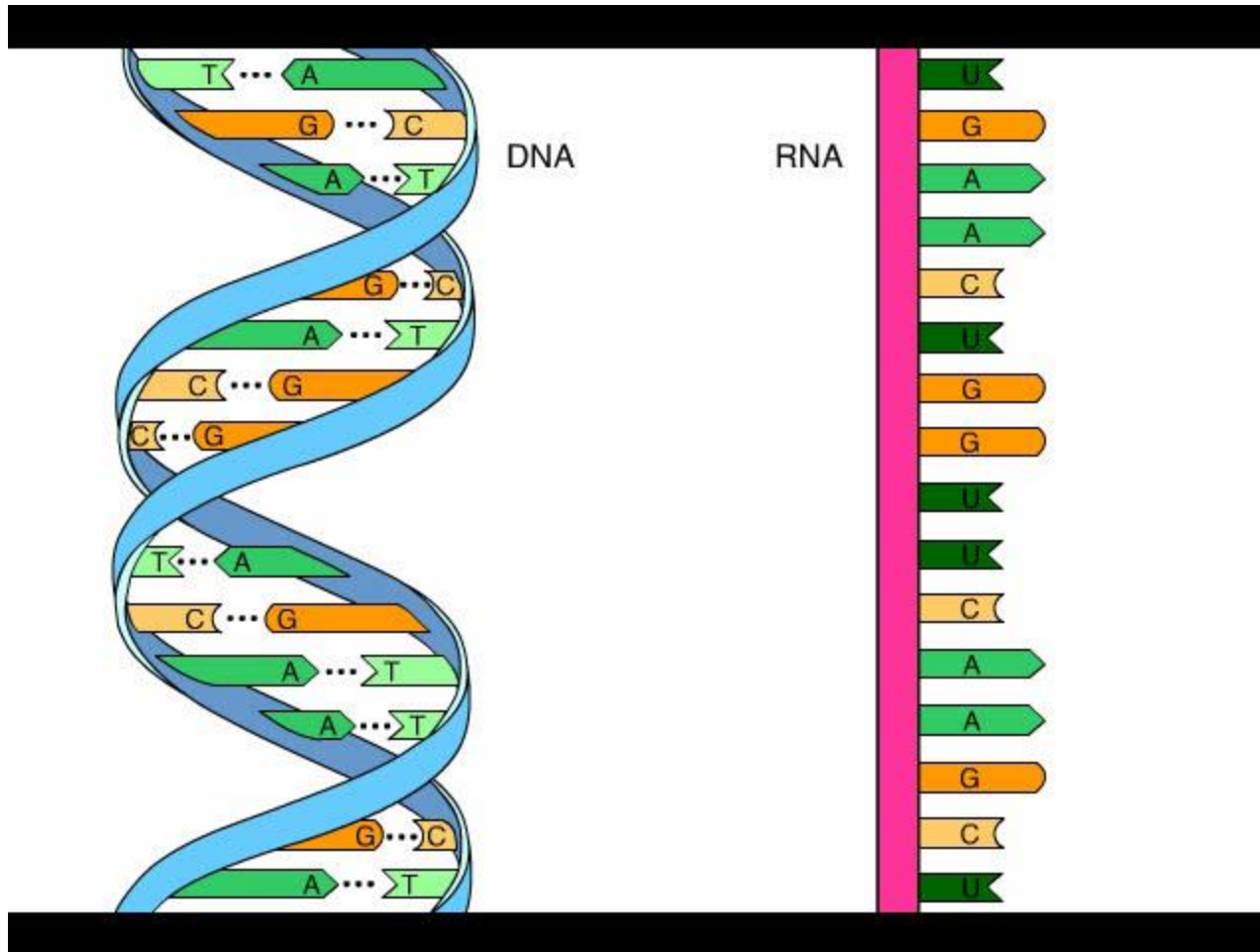


DNA → Chromosome

10.2 DNA and RNA are polymers of nucleotides

- The full name for **DNA** is **deoxyribonucleic acid**, with *nucleic* referring to DNA's location in the nuclei of eukaryotic cells.
- RNA (ribonucleic acid) is unlike DNA in that it
 - uses the sugar _____ (instead of deoxyribose in DNA) and
 - has a nitrogenous base _____ (U) instead of thymine.
 - _____ stranded

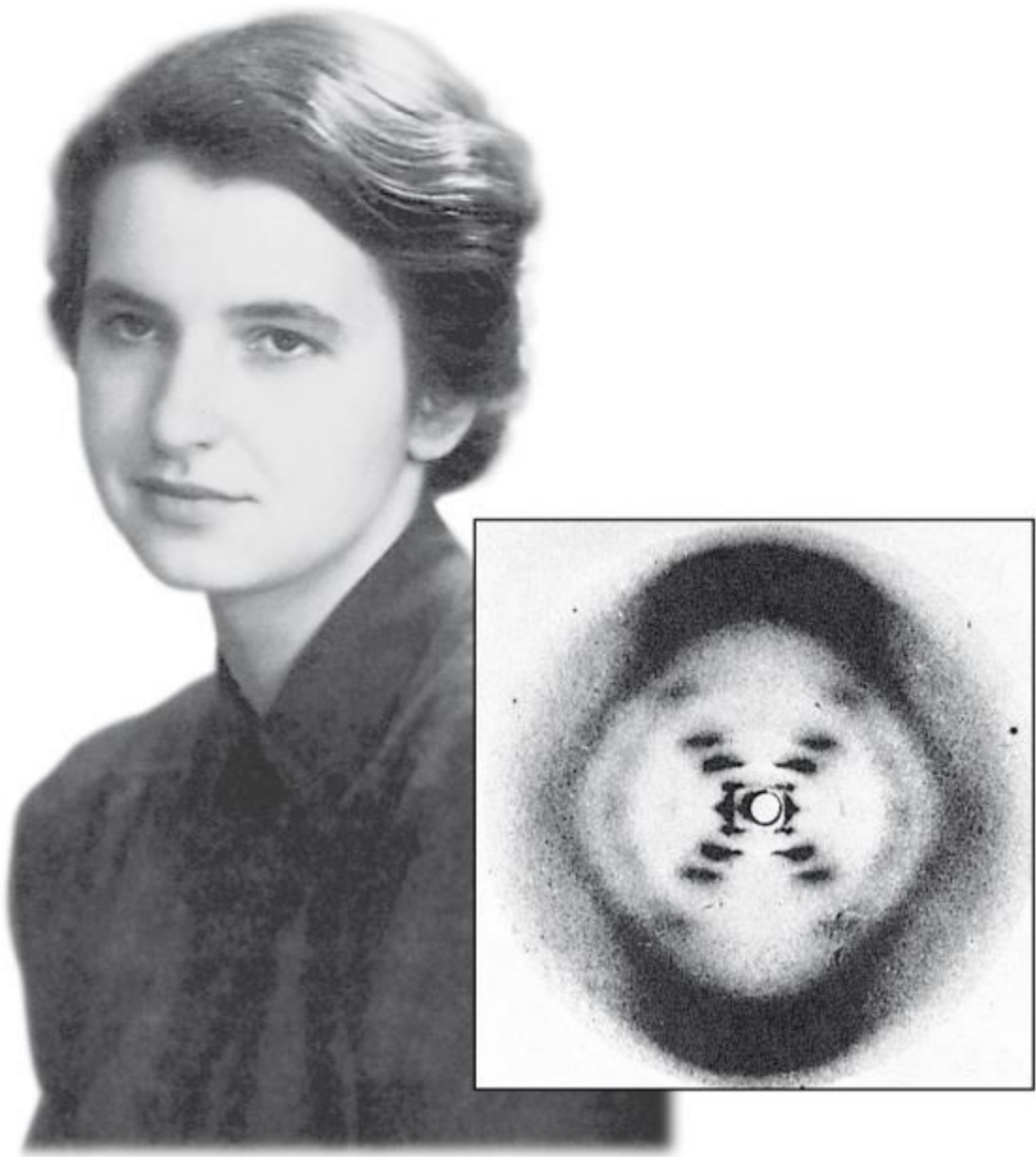
Animation: DNA and RNA Structure



10.3 DNA is a double-stranded helix

- American **James D. Watson** journeyed to Cambridge University in England, where the more senior **Francis Crick** was studying protein structure with a technique called X-ray crystallography.
- While visiting the laboratory of Maurice Wilkins at King's College in London, Watson saw an X-ray image of DNA produced by Wilkins's colleague, **Rosalind Franklin**.

Figure 10.3a-0



10.3 DNA is a double-stranded helix

- Watson and Crick realized that DNA consisted of two polynucleotide strands wrapped into a _____.
- The sugar-phosphate backbone is on the outside.
- The nitrogenous bases are perpendicular to the backbone in the interior.
- Specific pairs of bases give the helix a uniform shape.
 - A pairs with T, forming two hydrogen bonds
 - G pairs with C, forming three hydrogen bonds

Animation: DNA Double Helix

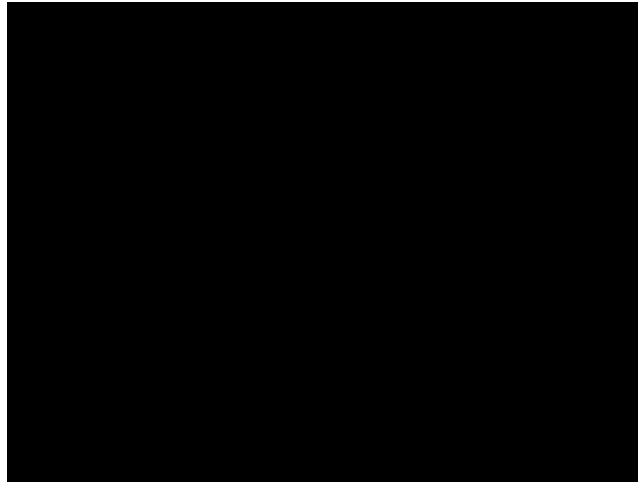
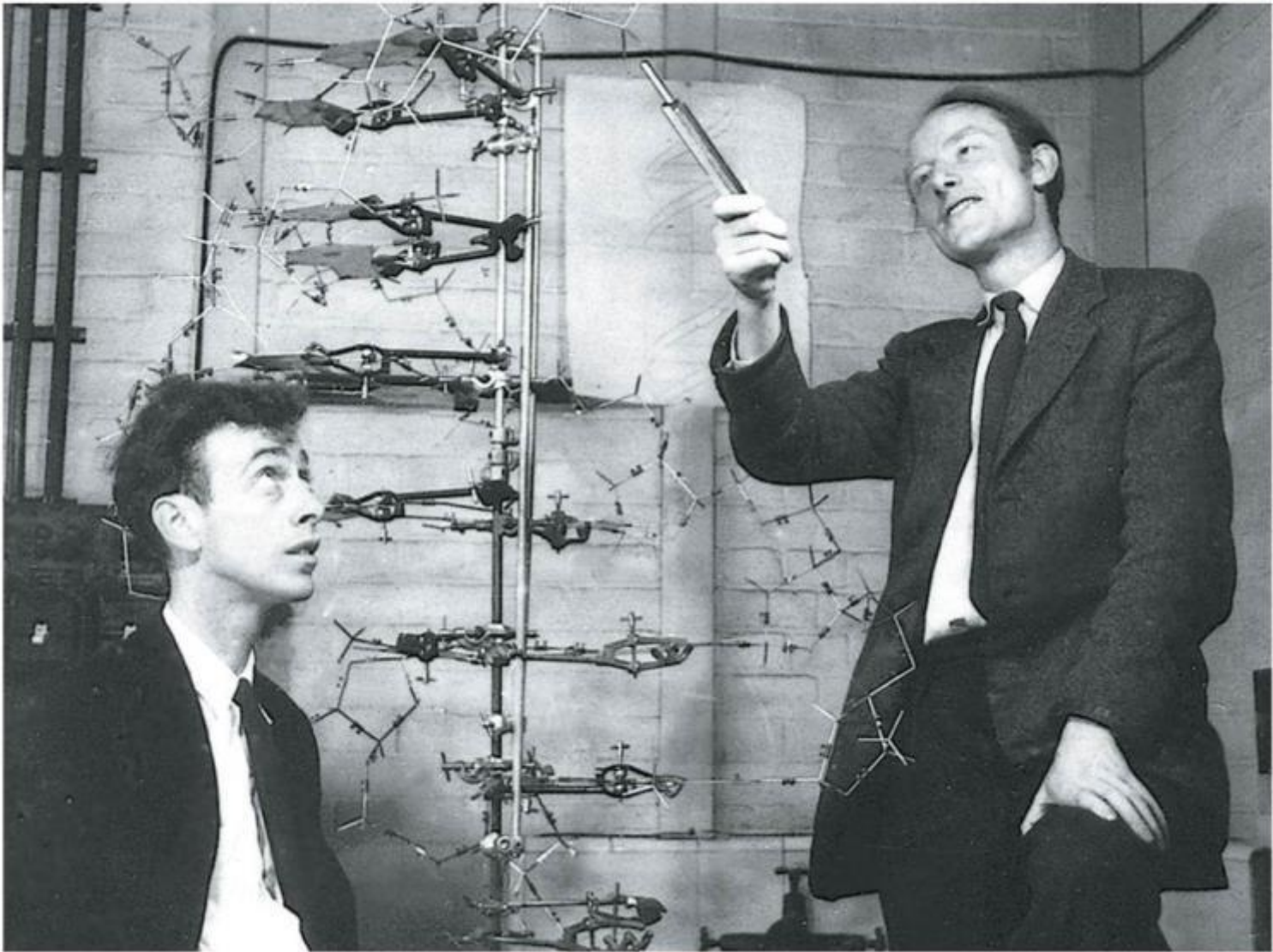


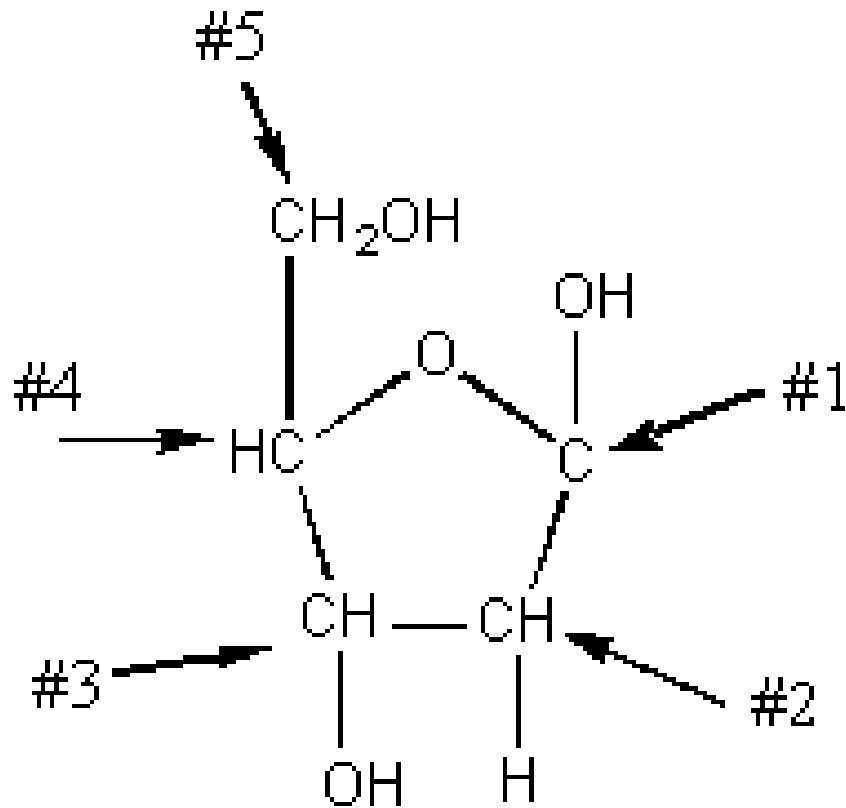
Figure 10.3b



Helix is formed via complementary base pairing between the _____ chains

a. adenine bonds with thymine
(double H bond)

b. cytosine bonds with guanine
(triple H bond)
- bases form 'rungs' of ladder



DNA is oriented by its bonds.

_____ end is the part of the DNA which ends with a **hydroxyl** (OH) group.

_____ end is the part of the DNA which ends with a **phosphate** group.

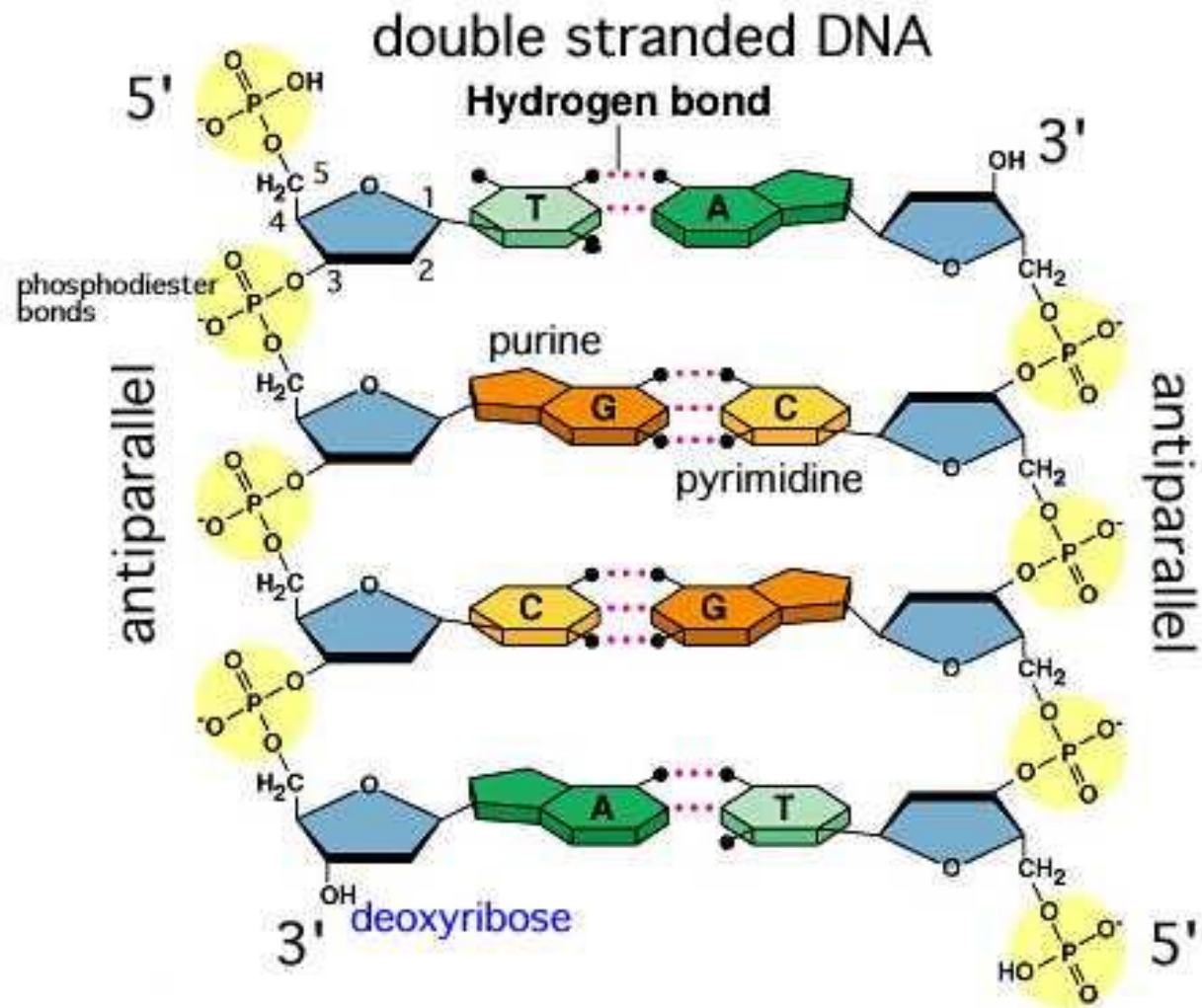
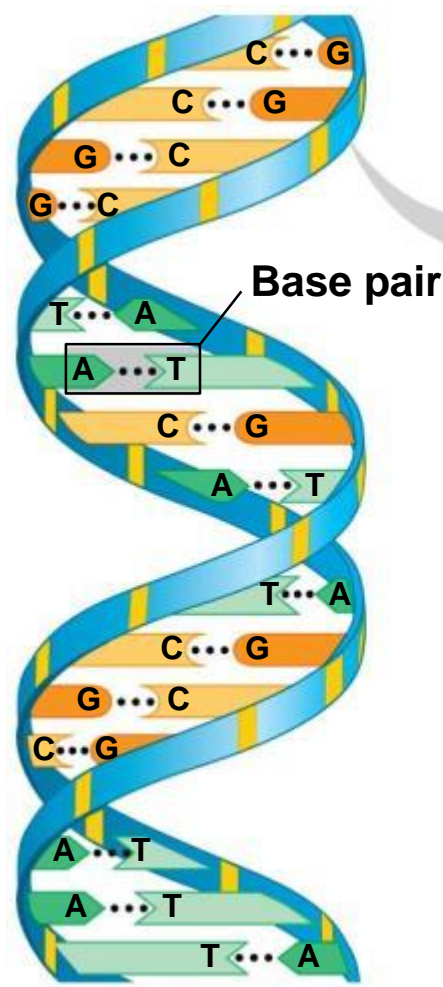
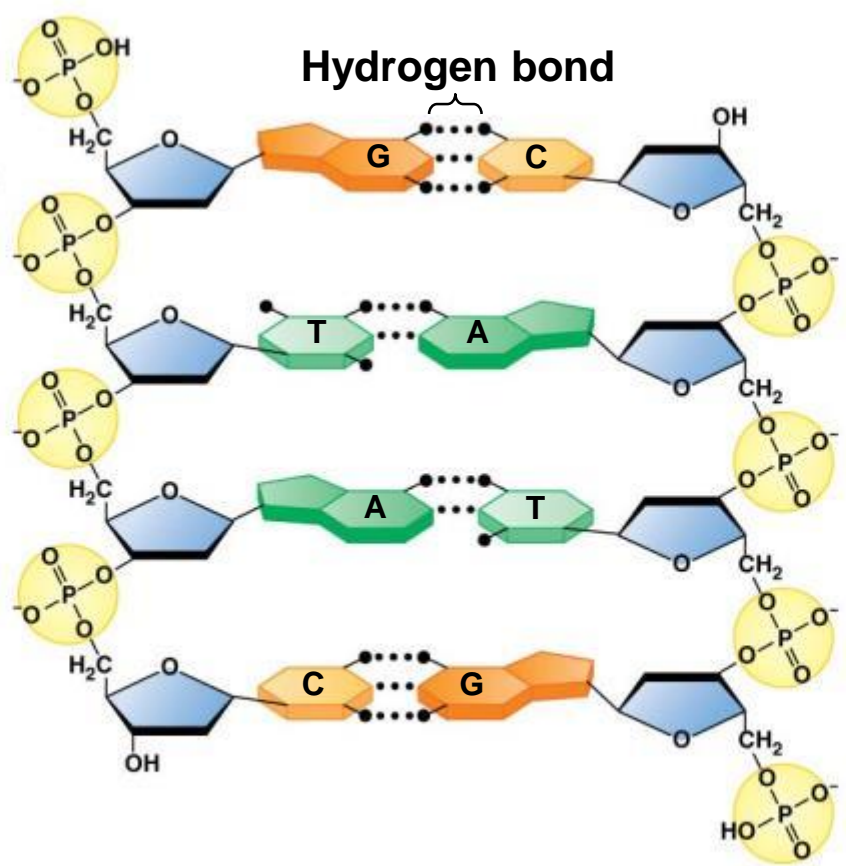


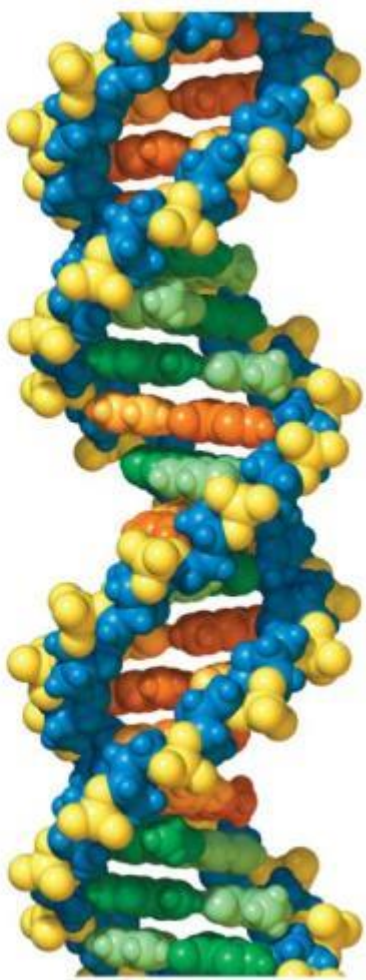
Figure 10.3d-0



Ribbon model



Partial chemical structure



Computer model