



Objectives

- ✿ Recount a brief history of the discovery of DNA.
- ✿ Describe the structure and function of DNA.
- ✿ Describe the structure and function of the 3 types of RNA.
- ✿ Explain complimentary base pairing.
- ✿ Compare and contrast DNA and RNA.



The History of DNA/RNA

- ✿ IN 1928 Frederick Griffith discovered that cells could transfer genetic information between each other (**transformation.**)
- ✿ In the early 1940's, Oswald Avery discovered that cells missing RNA and protein could still exchange genetic information, but cells missing DNA could not.
- ✿ In 1952, Martha Chase & Alfred Hershey made the connection that DNA was the molecule responsible for heredity.

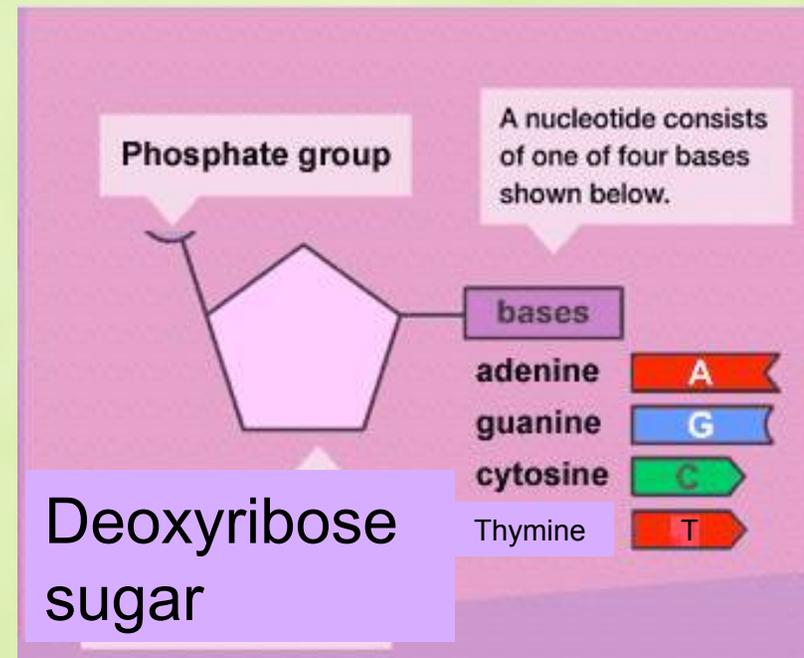


The Structure of DNA

- ✿ In the 1950's, James Watson and Francis Crick were trying to understand how DNA worked and what its structure was.
- ✿ A colleague named Rosalind Franklin managed to take an X-Ray diffraction photograph of a DNA molecule.
- ✿ Watson & Crick coined the phrase **Double Helix** to describe the structure of DNA (for which they won a Nobel Prize.)

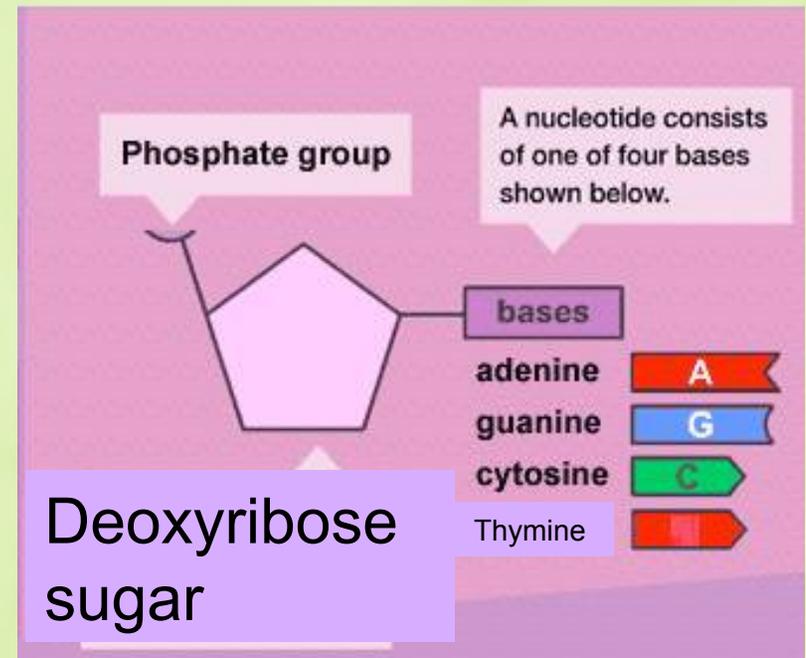
DNA

- ✿ **DNA** (Deoxyribonucleic Acid) is composed of small units (monomers) called **nucleotides**.
- ✿ All nucleotides are composed of:
 - ✿ Deoxyribose sugar
 - ✿ Phosphate group
 - ✿ Nitrogenous base.



Nitrogenous Bases

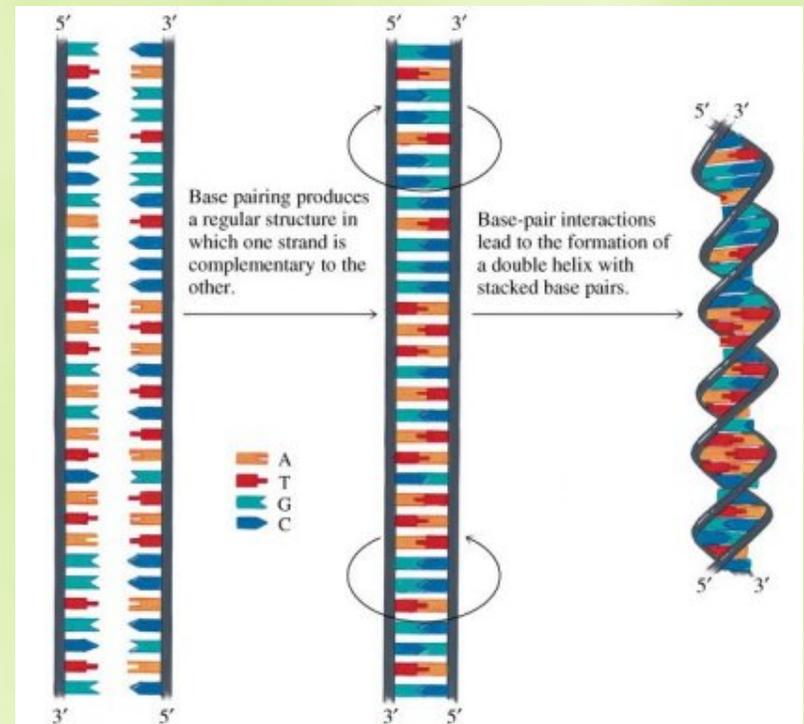
- ✿ There are only 4 different nitrogenous bases for DNA.
 - ✿ Adenine
 - ✿ Guanine
 - ✿ Cytosine
 - ✿ Thymine
- ✿ Each N.B. has a complimentary N.B. that it connects with to for the double helix shape.
 - ✿ A - T & T - A
 - ✿ C - G & G - C



The Double Helix

- ✿ As the complimentary N.B.'s pair up to form rungs, the phosphate groups bond to the sugar of the previous nucleotide to form strands.
- ✿ The strands are held together by strong covalent bonds, but the N.B.'s are held together by weak ionic bonds.

- ✿ One strand will then twist in a 5'(prime) direction and the other in a 3'(prime) direction creating a twisting ladder, or helical shape.





RNA

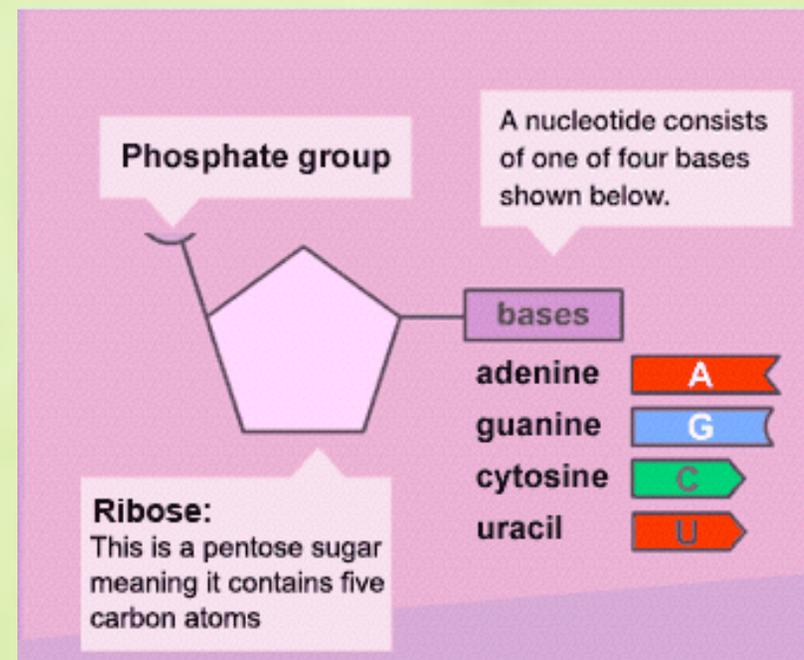
- ✿ DNA's main job is to store information.
- ✿ **RNA's** job is to use that information to make more DNA or protein to be used by the cell.
- ✿ There are 3 main types of RNA:
 - ✿ mRNA: Messenger RNA copies information from the DNA strand and takes that message to be decoded.
 - ✿ rRNA: Ribosomal RNA decodes the message in the ribosome to make protein.
 - ✿ tRNA: Transfer RNA retrieves the materials that the rRNA calls for.

The Structure of RNA

✿ Even though each type of RNA has a different job, the basic structure is similar.

✿ It consists of:

- ✿ Ribose sugar
- ✿ Phosphate group
- ✿ Nitrogenous base



DNA vs. RNA

✿ DNA and RNA are very similar;
however:

- ✿ DNA is a **double helix**, but RNA is a **single strand**.
- ✿ DNA has adenine, **thymine**, cytosine, and guanine N.B.'s, RNA has adenine, **uracil**, cytosine, and guanine.
- ✿ DNA pairs up **A-T and C-G**, RNA pairs up **A-U and C-G**.



What Do They Do?

- ✿ DNA acts as a blueprint for everything in the body.
- ✿ DNA can be copied in the nucleus through DNA replication (more blueprints.)
- ✿ mRNA will copy information from DNA by “unzipping” the molecule and using complementary base pairs to record the information.
- ✿ mRNA can take that information to rRNA where it will be decoded using the opposite base pairs and calls on tRNA to bring the required amino acids to build required proteins (protein synthesis.)



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