

DNA Replication and Protein Synthesis

DNA Structure

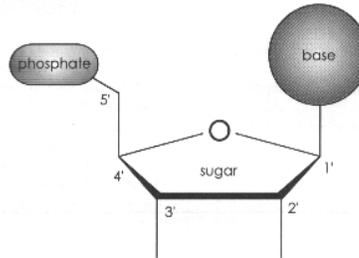
Recall that DNA is made up of a chain of nucleotides.

Each nucleotide molecule has 3 subunits:

- Phosphate Group
- 5-carbon sugar
- Nitrogen base

Four Possible Nitrogen Bases:

- Adenine
- Guanine
- Thymine
- Cytosine



DNA Replication

The 2 strands of DNA are complementary. (fit together like puzzle pieces)

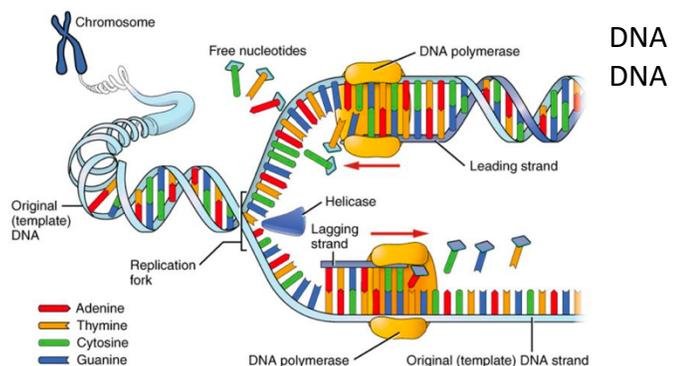
- Each strand can serve as a template for putting together the sequence of bases on the other half.
- DNA replication occurs before the cell divides so that each cell has a complete copy of DNA.
- Dna replication takes place in the nucleus of eukaryotic cells.

Steps of DNA Replication

- The first step of DNA replication is for the strand of DNA to be unzipped by a specialized protein
- In the second step another protein runs along each strand and creates a matching strand on both sides
 - While the new strands are created, the protein “proofreads” the bases to make sure they are paired correctly. (Usually only 1 mutation per 1 billion bases occurs.)
- 2 identical molecules of DNA are produced.

Each is made up of:

- ONE ORIGINAL STRAND
- ONE NEW STRAND
- Because the original strands of are conserved the process of replication is known as a semiconservative process



Proteins

- Proteins are a type of molecule in the body that perform most of the work.
- Proteins are chains of smaller molecules called amino acids
- Genes in dna are like recipes for proteins.
- Protein synthesis is the process of making proteins from these recipes
- DNA doesn't leave the nucleus
- RNA is a single-stranded copy of DNA that is used to send information outside of the nucleus

Structure of RNA

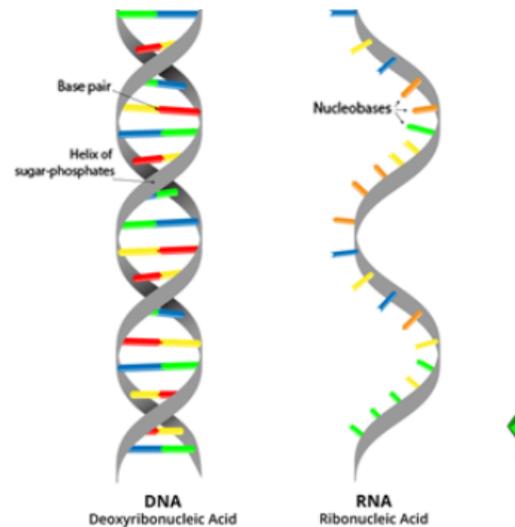
- RNA molecules are chains of nucleotides.
- RNA vs. DNA
 - Sugar in RNA is ribose, DNA is deoxyribose.
 - It is single-stranded.
 - 4 Nitrogen bases are:
 - Adenine
 - Guanine
 - Cytosine
 - Uracil replaces Thymine

Guanine

NOTE! All base-pair rules are followed:

C = G

A = U, since T is gone



Protein synthesis

1. Protein synthesis takes place at the ribosomes of a cell. These are found in the rough ER
2. A piece of RNA is made which contains the recipe for the proteins that the cell wishes to make
3. A ribosome attaches to the RNA and runs along it, reading its bases.
4. Amino acids that match the recipe on the RNA are brought to the ribosome and are assembled into a long chain until the protein is complete

From gene to protein

